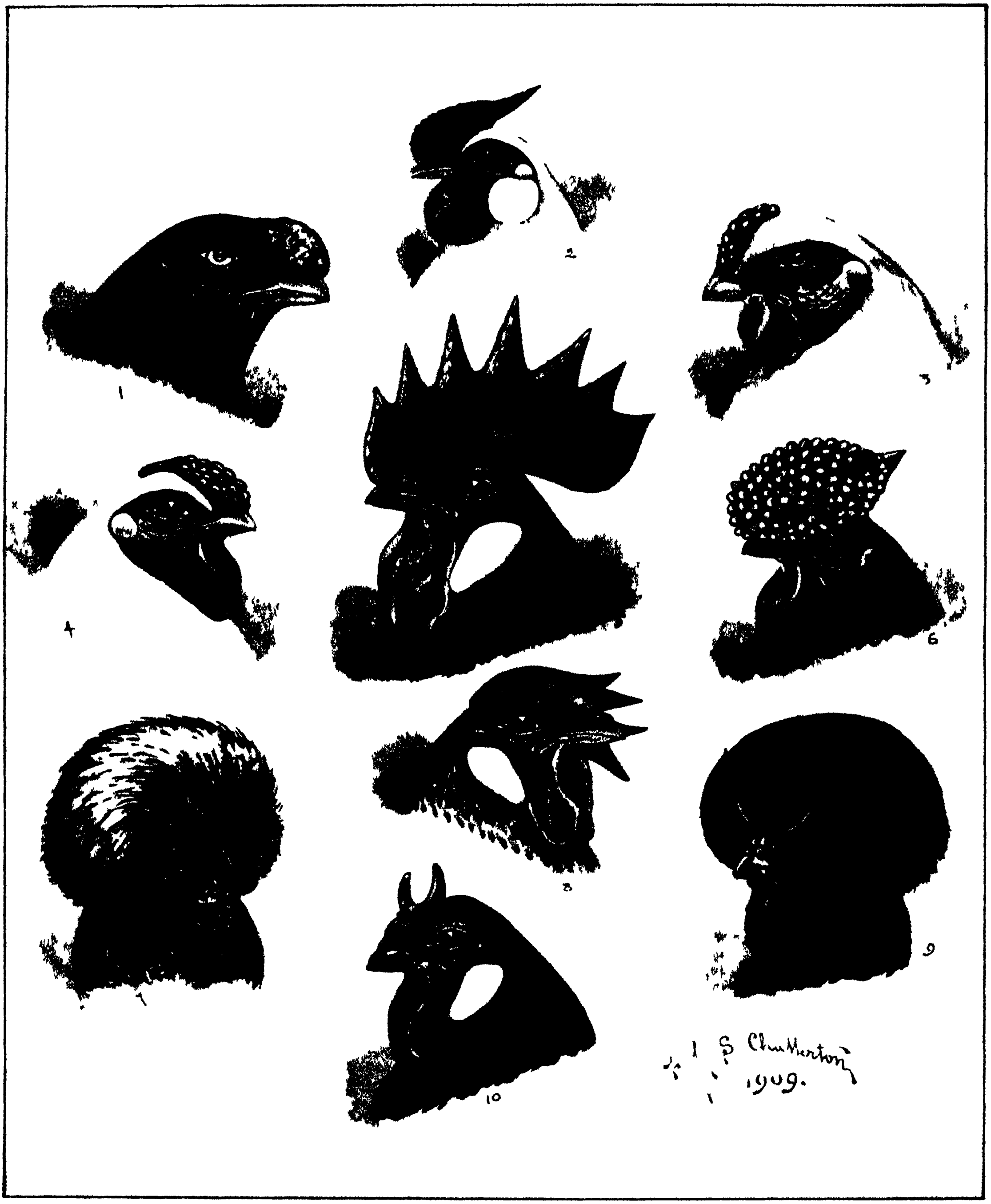
E04795

Geo. W. Pryor.

Aruvankadu. 1910.

PLATE No. I



Types of Combs.

1 Strawberry
2 Rose
3 Pea
4 Helmet

Single (upright)
6 Redcap
7 Leaf

8 Single (drooping)
9 V
10 Horn

THE

ENCYCLOPÆDIA

OF

POULTRY

EDITED BY

J. T. BROWN, F.Z.S. ("Chanticleer")

Editor of "Feathered Life," Poultry Editor of "The People," Special Contributor on Poultry to "The Sunday Chronicle," Author of "Poultry" (Greening's Useful Handbook Series) and "The Weekly Telegraph" Poultry Book, Etc.

(ILLUSTRATED)

Vol. I.

LONDON:
WALTER SOUTHWOOD & CO., LIMITED
30, CRAVEN STREET, W.C.

Contributors to this Work.

BYRNE, CECIL L., Late Lecturer and Practical Demonstrator on Poultry Farming at the Royal Agricultural College.
CHATTERTON, F. J. S., F.E.S. (Vice-President the Poultry Club), Crystal Palace and Dairy Show Judge.
COOK, W. H. (Poultry Club Committee), Club Judge to the Buff, Black and Variety Orpington Club, etc.
CAMPBELL, Dr. A.
de COURCY, H. (Ireland), late Lecturer to the Irish Agricultural Organization Society, Author of "How to succeed in the Poultry Business."
DAVIES, C. J., Contributor to *Poultry*, etc.; Author of "Poultry: A Handbook for Poultry Keepers," etc
EWART, WILFRED, H. G., Joint Author of "The Possibilities of Modern Poultry Farming."
EDWARDS, J. GODWIN
ELKINGTON, W. M., Editor of "Profitable Poultry Farming," etc
FREEMAN, W. MARSHALL, Barrister-at-Law (Legal)
GILBERT, ART. C. (Poultry Club Committee), Club Judge
GOODALL, A. A., Contributor to *Feathered Life*, etc
de GRAFF, E. T., "Rhode Island Red" Breeder and Judge (U.S.A.)
HORNE, W. B. (Vice-President, Utility Poultry Club).
HICKS, J. STEPHEN, Joint Author of "The Possibilities of Modern Poultry Farming"
HURST, J. W., of *The Field*, etc., Author of "The Life Story of the Fowl," etc
JENSEN, G. J. G., Contributor to *Farm Life*, etc
JONES, Rev. E. LEWIS (Campine Club).
JOHNSON, A. TYSILIO (Wales), Author of "Fowls for Profit," "Poultry Keeper's Manual," etc., Specialist Judge to British Ancona Club
MACKENZIE, Rev. J. W. A., President and Judge of Black and Laced Wyandotte Clubs
MATTHEWS, A. T. (Board of Agriculture).
"MID-ENGLAND," Author of "The Poultry Doctor," etc.
MONTAGU-TURNOR, D., Hon. Sec. and Treasurer, White Leghorn Club
"PRACTICAL POULTRY FARMER."
ROLLINSON, H. C.
RICHARDSON, E. W., Hon. Sec. Utility Poultry Club, Lecturer for Cheshire County Council
SMITH, F. CHALONER, Faverolles Club Judge
SHAKESPEARE, JOSEPH.
SHARPE, S. C., Poultry Expert and Lecturer under the East Sussex County Council.
VALE, W., F.Z.S., Author of "Profitable Poultry,' etc., etc.
WALTON, J. W. (Indian Runner Duck Club).
WALTON, W. H., of *Feathered Life*.
VERREY, L. C., Past President of The Poultry Club, Author of "The Leghorn Fowl," etc., etc.
WATSON, CLEM, of *The Feathered World*.
Etc., etc.

Preface.

The title of this work is so self-explanatory that any lengthy definition of its scope would be superfluous. It aims at providing everyone interested in poultry, whether fancier, farmer, small holder or "backyarder" with a reliable book of ready reference upon every phase of the subject. But at the same time it aspires to be regarded as popular, consequently we have deemed it expedient wherever possible, to eschew the dry-as-dust style which the ordinary encyclopædist too frequently affects. To attempt to cover the wide field of poultrydom in this way has, it may be surmised, proved no easy task, and it would be idle to assume that the work, despite every care, is not open to criticism. The many and varied interests of the Poultry World are not without conflicting elements, and there are quite a few fanciers who agree to differ, more particularly when the relative merits of the respective breeds to which they happen to be partial are under discussion. Bearing this in mind, great pains has been taken to avoid, as far as possible, the introduction of controversial matter. Outside the "fancy," we must confess we feel on safer ground, for on the policy of introducing the latest and most up-to-date methods of general management there can be but one opinion. During the past few years the Poultry Industry in this country has been making rapid strides, and there is every evidence of continued progress in the near future. The poultry-keeper of to-day must, therefore, keep well abreast of the times, and we venture to believe and hope that the present work will enable him in a great measure to do so.

This is, we believe, the first occasion on which an attempt has been made to issue a work on poultry in encyclopædic form, and the advantages of such a form, in this all-too-strenuous age, will, we think, be sufficiently obvious. Whatever the faults, either of commission or omission, we hope it may at least be conceded that we have made an honest attempt to focus into a compact whole a mass of information which, with one or two notable exceptions, has hitherto only been available through the medium of innumerable handbooks—excellent in their way, but presenting no solid front, as it were, to the friendly onslaught of the seeker after knowledge at a glance.

Our list of contributors, it will be noted, consists, without exception, of experts, each of whom in his particular sphere can claim to write with authority. To this staff, every member of which has worked loyally and well, we tender our warmest thanks. More especially would we mention in this connection Mr. J. W. Hurst, the author of that charming book, "The Life Story of the Fowl," whose active co-operation has done much to lighten the editorial burden and will long remain a pleasant memory.

J. T. Brown

INDEX TO PLATES FOR VOLUME I.

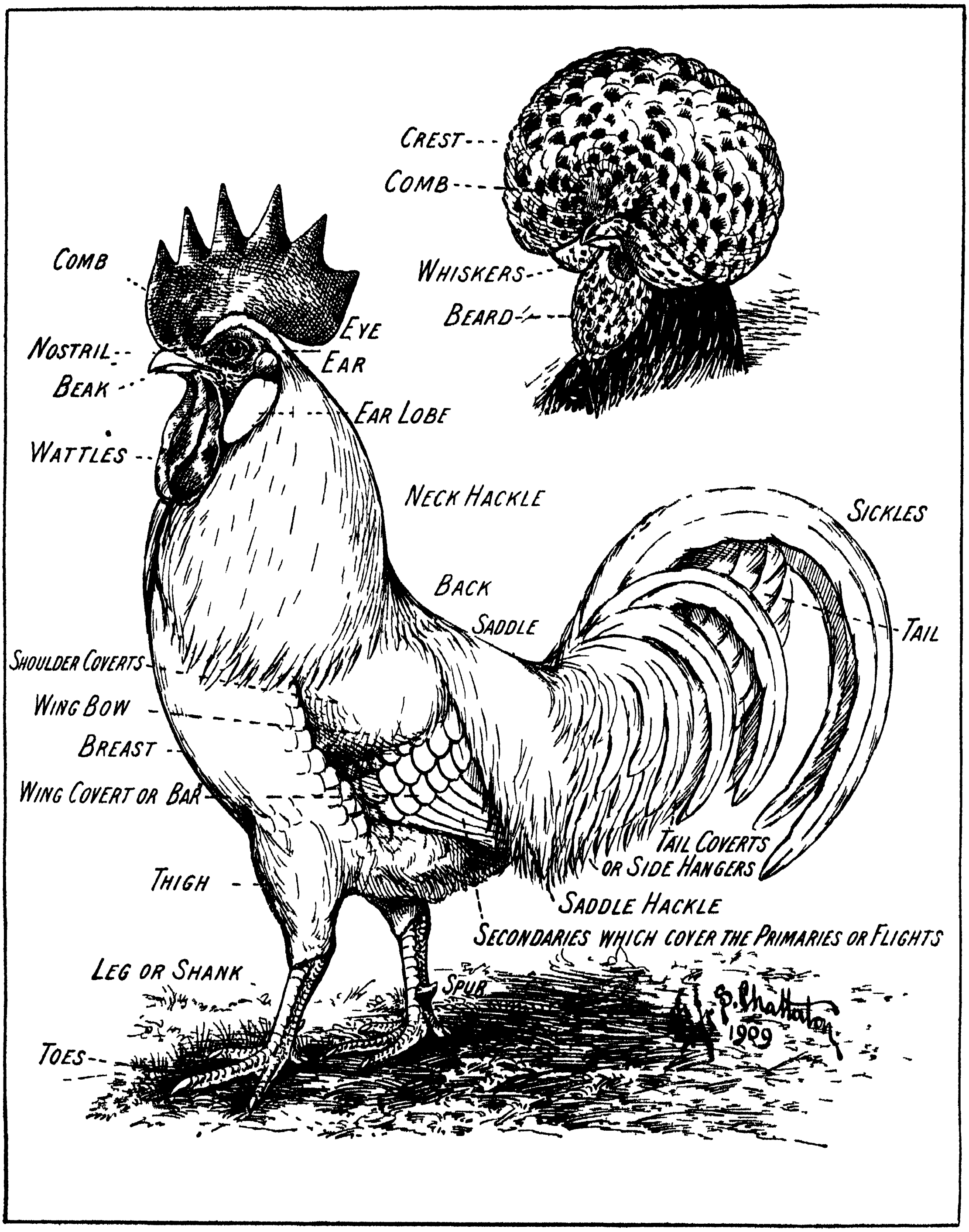
PLATE.

Anconas, Single Comb 3
,, Rose Comb.. 4
Andalusian 5
Bantams, O.E. Black Red Game .. 6
,, ,, Partridge ,, .. 7
,, ,, Duckwing ,, .. 8
,, Modern Black Red ,, .. 9
,, ,, Birchen ,, 10, 12, 13
,, ,, Pile ,, .. 11
,, Black Pointed Japanese .. 14
,, Black Japanese.. 14
,, Grey ,, ... 15
,, White ,, ... 20
,, Barred Plymouth Rock .. 16
,, Golden Sebright 20
,, Silver ,, ... 17, 18
,, Partridge Wyandotte .. 19
Brahma, Dark 21, 22
Cochin, Buff 23, 24
,, White 25
Combs, Types of (Frontispiece) .. 1

PLATE

Dorkings, Silver Grey 26, 27
,, Dark 28
Ducks, Aylesbury 29, 30
,, Indian Runner 31, 32
,, Buff Orpington 33
,, Cayuga 34, 35
,, Crested 36
Faverolles 37, 38
Game, O.E. Black Red 39
,, ,, Silver Duckwing 40
,, ,, Spangled 41, 42
,, Modern Pile 43
,, Sumatra Black 44, 45
Geese, Emden 46
Hamburgh, Black 47
Houdan 48, 49
Incubation : Development of the
Embryo 50, 51, 52
Indian Game 53, 54
Technical terms used in describing
Fowls 2

PLATE No. 2



Technical Terms Used in Describing Fowls.

THE
ENCYCLOPÆDIA OF POULTRY

ABNORMAL EGGS. (*See* "Eggs, Abnormal").

ACCIDENTS. The principal external accidents likely to happen to poultry are injuries to the comb and wattles, torn eyes and similar mishaps—also occasionally burning or scalding. Details of these are given below. (See also "Poisoning.") Little or nothing can be done for a fowl which injures any of its internal organs, as, for example, by swallowing a sharp piece of glass, which, before it reaches the gizzard (the walls of which are very thick) penetrates and causes injury to some of the passages. Such an occurrence will probably not be revealed unless it terminates in death. Pins are sometimes swallowed and are almost certain to cause death.

—— **BURNS AND SCALDS.** Poultry do not often suffer from the effects of burning or scalding, but occasionally one does get injured by boiling water used in the preparation of food. A fowl is somewhat more protected against the effects of an accident of this sort than a human being or an animal, on account of the presence of the feathers, which are non-conductors of heat and thus tend to shelter the skin to some extent. Nevertheless for a quantity of boiling water to fall upon a fowl, or for the bird to fall into a bucket of hot liquid, may entail serious consequences. Sometimes a fowl will get burnt by a hot cinder from an out-building fire, and this may cause a sore place that will be very difficult to heal. In any really serious case the best thing will be to kill the bird at once—for obviously it would be an extremely difficult matter to dress a scalded place beneath feathers; if, however, there is only a small patch, this, if carefully treated with frequent applications of lime water and linseed oil in equal parts, will gradually heal. If, however, it be in any way neglected it will probably turn to a running sore (especially if the bird has any tendency to scrofula), and it will then be extremely difficult to get healed up.

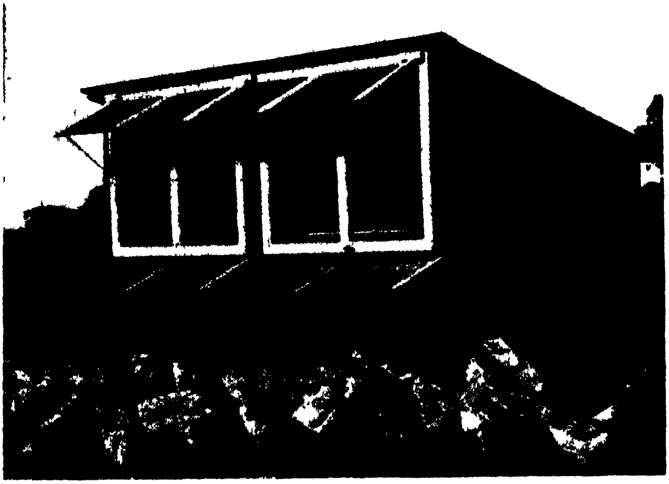
—— **INJURIES TO COMB, EYE, ETC.** External injuries, such as a torn comb, a good big cut, or a torn eye, which a fowl will sometimes get from a thorn in passing through a hedge, or some similar incident, need most of all to be kept perfectly clean and sewn up properly. A gaping wound should first be bathed with warm water containing a grain or two of permanganate of potash, or a small quantity of some other suitable antiseptic, all particles of foreign matter being carefully removed; then the wound should be stitched with a surgical needle and either catgut or silk. A little carbolized vaseline can then be smeared over the place, and, if necessary, a bandage can be put round the bird, so as to prevent it getting at the stitches (which, as soon as the place begins to heal, will begin to itch and irritate) until a complete healing has been effected. The same treatment may be applied to other matters, such as injuries to the comb and wattles. Some birds are very pugilistic, and do a good deal of mischief before they are discovered, and it is no uncommon thing for one cock to tear off a portion of the wattle of his rival. An injured comb or wattle should be carefully bathed and anointed with carbolized vaseline, and the bird should not be allowed at liberty again until all traces of the injury have disappeared, lest the others, being attracted by dried blood, begin to peck at the place again and start the trouble afresh.

—— **FRACTURED BONES.** More or less serious accidents frequently happen amongst poultry, and as these accidents occur at most unexpected times, it is necessary that the poultry keeper should know how to set about rendering first aid. If a bird puts its wing out of joint or breaks its leg, and its owner is a handy man, and can spare the time to deal with it, there is no reason why an effective cure should not be brought about with comparatively little trouble. The important point is to deal with an accident at once, before the injured bone has time to set into a different position. The flesh and bones of healthy poultry have a marvellous vitality about them, which enables Nature to set herself right in a very short space of time.

A very common accident is disjointing of the thigh, which is due to careless people taking hold of a fowl by one leg, a cruel and reprehensible practice, and one likely at any time to cause a dislocation of the thighbone. In such a case, or where there is a dislocation of the wing joint, careful examination must be made first of all, and then the owner should get the dislocated joint back into its proper socket, and when this has been done, bandage the bird's body with an ordinary two-inch surgical bandage, in such a way that the limb cannot possibly be moved. It should be kept in this position for several days, the best way to do this being to " sling " the bird in the same manner as is practised by veterinary surgeons in dealing with horses.

Another more troublesome accident still to deal with is a broken leg, caused perhaps by the poultry keeper accidentally putting his foot upon the leg of a fowl when he has been surrounded by birds at feeding time. A breakage or fracture is much worse than a dislocation, particularly if it is a compound fracture, as it nearly always is in such a case. If the bird be of little value, it is really better to break its neck. But if, for any reason, the owner wishes to save it, then a splint will have to be made, and the broken leg will have to be felt, and the fractured edges of the bone be made to fit together as carefully as possible (bearing in mind that the bird will probably be suffering intense pain). This limb having been fitted together so, and the splint, which should be made of soft wood, having been applied to it, can be bandaged up, and the bird be laid with both its legs tied upon some soft straw, and be kept there for forty-eight hours, when probably the process of rejoining will have started well, and one leg can be released, a bandage being put round the wings to prevent the bird from fluttering and hurting itself in some other way, or, better still, the " slinging " process may be tried.

ACCOMMODATION. FOWLS IN CONFINEMENT. Although the keeping of fowls in confinement is unnatural, it is evident that they could not otherwise be kept by the great majority of poultry keepers in this country ; nevertheless, the maintenance of health in such circumstances is a matter involving careful management, under which they can be so kept with profit to their owner and without any serious discomfort to themselves. The character and situation of their run must be conducive to the upkeep of health, and the breed selected must be suited as far as possible to the local conditions and limitations. Egg production is the chief purpose for which fowls are kept in confined runs, and there are very few conditions of confinement in which rearing is possible, or the production of eggs for incubation is compatible with the necessary vitality in the germ or a sufficiency of stamina in the chickens. This being so, the selection is limited for most purposes to the so-called laying breeds, and where general purpose fowls are preferred the discouragement of the incubating habit is essential; the presence of a male bird in the pen is also unnecessary, and quite undesirable in the interests of economy. Although it is an unnatural condition of life the results of domestication have largely operated to fit some breeds for confinement more than others, and the novice would do well to choose his birds as far as possible from those that are generally characterized as suitable for such situations. As a rule, there is a failure to appreciate the all-important point of selecting a breed that is found to do well under similar conditions and amid such general surroundings as those of the prospective poultry keeper's proposed yard. To such an one a fowl is a fowl, and all the little subtleties that combine to make breeds so different are overlooked, if not unknown.



A good type of House for Winter Layers.

Although those who are old in experience may venture at times to keep breeds in situations or under conditions that are quite unsuited to them, such an experiment would mean utter failure for the beginner. The novice must not only make up his mind as to why he wants to keep fowls, but unless he is in a position to suit his situation to the breed selected, he must reverse the process and fit the breed to the locality. The latter is more often the case than not, the accommodation available for house and run being fixed and unalterable, it may be urban, suburban or rural, and not all breeds will do equally well in all or even two of these three situations. Sometimes the suburban or even the urban dweller can give his fowls a bigger range than is available for some rural residents; but generally, of course, the opposite is the rule; and in any case the margins of confinement have an all-important bearing upon selection. It may be taken for granted, therefore, that the greater number of amateurs have only a strictly limited space at their command, and for the production of eggs under such conditions they cannot do better than stock a good strain of Leghorns. The novice whose aim is simple egg production should avoid the purchase of fowls of any breed from the yards of those who breed for exhibition points, the existing conditions of showing and judging being very largely inimical to useful aims.

——**SUITABLE BREEDS.** Confinement is a state of being shut up or limited by a boundary, and a limited run may be anything from a dozen feet of flagged yard to a five-acre field; so that when a breed is classified as being suited to confinement, the description must be understood in a general sense, and commonsense must aid selection. The following are some of the breeds of light build best suited to confined runs :—

ANCONAS—good layers of medium-sized white-shelled eggs, chiefly produced in spring and summer. They are hardy, but do best on a dry soil.

ANDALUSIANS—good layers of large white eggs. Hardy and light feeders.

LEGHORNS—excellent for the purpose, all-round good layers of large white eggs. Hardy under most conditions.

MINORCAS—excellent layers of large white eggs. Hardy, but less so than the former.

Although all the above bear confinement well, the black Minorca is probably best for very close confinement, but the management must be good; and profit in winter demands sheltered and covered runs.

Among the breeds of heavier build that thrive in a state of confinement are the following:—

BRAHMAS—layers of medium dark-brown eggs, and capable of a good production.

HOUDANS—good layers of large white eggs. Thrive in a not too limited enclosure.

LANGSHANS—good winter layers of medium dark-brown eggs. Very hardy and bear confinement.

ORPINGTONS—thrive well in confinement, and capital layers of medium light-brown eggs.

PLYMOUTH ROCKS—good layers of medium light-brown eggs. Very hardy and bear confinement.

WYANDOTTES—good layers of medium light-brown eggs. Hardy, and do well in confinement.

——**EARTH RUNS.** The keeper of fowls in confinement has too often to content himself with the use of earth runs, the keeping of grass in even fair condition being out of the question within any narrow limits when subjected to the fouling influence of poultry. To overcome his difficulties to some extent it is the common practice, where the space is sufficient, to provide two runs to one roost house, allowing the fowls to use them alternately; but in any case, if the limits are at all narrow it is almost impossible to keep one earth run sufficiently clean for the preservation of health in the stock. The covering of a small run is in most cases essential, because if the ground is kept dry it will remain sweeter for a very much longer period; but in most circumstances of very close confinement the best plan, in addition to the covering, is to use gravel. This use of gravel for the purpose is really economical after the initial outlay, and the method to adopt is as follows:—Dig out and remove the earth surface to a depth of about nine inches, or more if desired, and fill up to the original level with good sound clean gravel. Roll it well until it settles quite solid, hard and smooth, and it may be kept sufficiently clean for a long period (if unexposed to rain), by a daily sweeping up, and removal of the droppings and refuse. When common-sense suggests that the time is ripe for its removal, it should be removed and placed out in the open, filling up the run to the old level with a clean supply, treating it as before. The soiled gravel, if fully exposed to the action of the weather, will become gradually cleaned, and will be ready for use over again when the second lot is soiled. Used in this manner, a couple of loads will keep a small earth run in good order for years, the alternate use and weather-cleaning being sufficient for the purpose under careful management.

——**TO CLEAN FOUL LAND.** The digging of land in sections at intervals will considerably lengthen the time during which it will remain sufficiently clean for running poultry over, but there inevitably comes a period in conditions of confinement when a rest and cleansing is essential. The best and only efficient method of sweetening land that has become foul through the presence of fowl manure in excess, is to remove the birds to other quarters, dig the ground thoroughly and deeply, and crop it with some suitable free-growing vegetation; and the only method with fouled grass land is to rest it, and take a crop of hay off. In either case, the necessity for a second cropping is a matter for the exercise of judgment on the part of the cultivator; but rest and cropping is the only thing to do in such circumstances.

Should the land have been run over by diseased fowls, a dressing of lime is advisable, in the proportion of about one cwt. to a pole of land, the lime being put out in heaps and slaked, and subsequently evenly spread upon a fine dry day.

——**FOWLS AT LIBERTY.** After all, in this country, at any rate, liberty is only comparative, and upon the largest farm there are boundaries and limits to their wanderings. Not only is this inevitable, but it is also desirable in the interests of profitable production, and any way, it is essential to limit the number of birds according to the acreage of their liberty. Not only so, but it is found that there must be limits set to the number of birds that may be profitably run together in one flock—whatever the measure of liberty. It is, however, obviously impossible to formulate exact rules which shall apply equally in all cases, to the keeping of fowls in profit and health upon any area; the character of the soil, considerations of arable and grass land, the method of treatment, the description of fowl and the object of the stocking, are among the many influencing conditions requiring judgment in individual cases. Broadly speaking, it may be said that fowls run permanently upon grass may be safely maintained at the rate of about one hundred head per acre, but that where land is alternately stocked and cropped, the number may be safely increased on account of the sweetening of the land consequent upon cropping. Upon ordinary pasture with other and four-legged stock, it is generally preferable to keep the head of fowls down to from twenty-five to fifty per acre, according to circumstances. On the other hand, by the adoption of the colony system, and the consequent continual removal of the fowls from field to field, the conditions as regards fouling by manure are materially altered, and a farmer is enabled to keep many more fowls than would be possible by more permanent arrangements. As a general rule, however, more is lost than is gained by the endeavour to keep the stock up to the maximum capacity of the available area, and as regards the size of flocks, about twenty-five fowls in each will generally be more profitable than a larger number.

——**PENS.** The keeping of different breeds and varieties, or the stocking of poultry of different descriptions necessitates some division by penning, as is also essential in some cases for the separation of the breeding stock, the sexes, and the chickens of various ages; and such special pens should as far as possible be so arranged as to avoid any undue interference with grazing or other primary uses of the land. An orchard is an example of a suitable situation for special pens, as being more or less sheltered by hedges—provided the trees are not too thickly placed to make the ground undesirable in wet weather. Whatever the site selected, the houses should occupy the highest ground, and preferably face the south with the wire-netted enclosures running downhill.

Among the considerations influencing the selection and the required space, it must first of all be decided whether the use of the pens is to be permanent or seasonal. If the occupation is to be continual provision should be made for two runs to each house, to be used alternately; but if the use is to be confined to a breeding season, or otherwise reasonably limited, the basis of the planning may be—one run, one house. Whatever the breed kept at the time of making the pens, it is usually wiser to place the dividing netting at a sufficient height to meet all eventualities, such as a future change in breed, and the use of the pens by more active birds than may be in use at that time. The best netting for all such purposes is that of two or two-and-a-half inch mesh, and of not less than about eighteen gauge; but in any case, the bottom portion of all divisions between pens must be boarded to a sufficient height to prevent the adjoining fowls seeing one another, otherwise fighting and damage will inevitably result. In pens, the use of which is limited to a season, an easily movable type of house is most suitable; but for permanent occupation in such an arrangement, a fixed house answers the purpose better. In any case, the roost house must allow a minimum of ten cubic feet of air space per bird, and the grass runs would allow the limited accommodation at the rate of one fowl to every hundred square feet; but in gravelled and covered runs, the birds may be kept at the rate of one to every fifteen square feet—provided that the general rules of health are observed.

—— **HEDGES.** Apart from the improved appearance of pens and runs that are surrounded, or partially so, by hedges, they have an important influence upon the thrift of the fowls on account of the protection they afford from wind or sun. A sufficiently high and old-established hedge is moreover a saving as regards wire-netting, a sufficient width to stop gaps and cover the thinness of the bottom being all that is necessary. When permanent pens and runs are erected, it is therefore, in every way economical to plant hedges alongside the divisions where they will be of most service when they have grown to maturity. Such hedges are usually composed of white thorn, which is easy to grow and affords sufficient protection when thickness is obtained by proper trimming. The myrobalan plum is also similarly employed, and is a quick grower. Young roots for hedges should be planted in double rows in autumn, and those mentioned will be suitable for most soils and situations in which fowls may be ordinarily kept. A new hedge will require about three years before it is very serviceable, so that other shelter must be provided meanwhile; and in addition to hedges, clumps of evergreens should be planted where they will afford shade and shelter, and improve the appearance of the surroundings—the rhododendron makes a suitable growth for the purpose.

—— **PLANNING POULTRY YARDS.** The requirements of those who undertake the breeding of pure breeds systematically are by no means extravagantly extensive, but they are necessarily more stringent than would usually be possible or desirable under ordinary farm conditions, and also such as are out of the question for the amateur with strictly limited space. As no two breeders would probably have ground of the same shape and size available, no useful purpose would be served by the draughting of a plan, and all that can be done is to suggest the general lines upon which the novice will find that his requirements run, and for which he must make provision in his preliminary survey of his available area. Previous preparation is essential to success in poultry breeding, and the purpose and extent of the operations must in many cases be dominated by the space and its possible adaptability to the needs of the stock; to commence breeding without seeing the whole course to the end, must inevitably result in confusion—if not loss. The following suggestions are confined to the bare essentials for the breeding of a single variety of fowls, with the necessary accommodation for exhibition and surplus stock.

First, the breeding pens, consisting of sheds with sufficient room for perches, nest boxes, and an open space for shelter and scratching; in front of these should be gravelled runs, with grass runs beyond —the latter of a sufficient size for division and alternate use, with, if possible, a further stretch of grass for use out of the breeding season. The next provision must be for cockerel and pullet pens, both of the same construction and consisting of roost house, shelter, and large grass run—to be used when the birds are about ten weeks old. When the birds are old enough for final selection and rejection, the "wasters" must be removed to other similar pens until they are disposed of. For the fattening of such wasters as are for disposal as table fowls, a suitable shed and fattening appliances will be required; and another shed will be needed for the preparation and training of birds intended for show purposes. A store and food mixing room is also a necessity. In addition to the foregoing, an incubator house is commonly required, as well as accommodation for sitting hens; also a covered chicken nursery for the protection of coops or foster mothers in the early months, with a sufficient extent of ground in front for early rearing purposes—up to the age of ten weeks. It is further advisable to reserve some portion of grass land for emergency use, such as might occur in the event of an outbreak of disease and the temporary need for fresh ground.

ACCOUNTS. The keeping of accounts must be an essential part of every poultry-keeper's work. It does not matter so very much what style of book-keeping he adopts so long as it is practical, comprehensive and not too complicated. Indeed, the simpler it is the better. Most men, whatever their business may be, whatever system of account keeping they may have been taught in their youth, generally drift into "a way of their own," and so long as it is a plain and straightforward way it will serve its purpose. Poultry-keeping, being a more or less complicated pursuit, there is all the more reason for studying simplicity, consistent with accuracy, in keeping a statement of accounts. There is an infinity of detail that must be considered. Indeed, it is doubtful if there is any other rural industry where detail plays such an important part as it does in poultry-farming. Every hen is an individual and every egg must be accounted for. Any negligence in keeping a record of the odd chickens that die. of the addled or unfertile eggs, of the value of the poultry manure and of expenses incurred by marketing, postages and such like must not be forgotten, for it is upon such as these that the profit or loss largely depends.

The simplest form of account book is one that contains nothing more than a place for expenditure on the one side and one for income or receipts on the other, and such an elementary affair demands no further reference. But something more comprehensive is necessary where the business is a considerable one, and the examples* given here will enable the reader to understand at a glance how best to include all the items of income and expense in the most concise and yet simple manner. In *Example No. I.*, for instance (supposing there are not less than thirty-one horizontal lines to a page) we have a place to book the daily receipts from each department for a month. We can not only do that, but are enabled to keep every item distinct, so that the poultry-keeper who is anxious to compare the takings from one section with another, may total up at the foot at the end of every month. or oftener, the aggregate amounts, balancing the daily totals, as shown, down the extreme right of the page. *Example No. II.* (to face *Example No. I.*), will now explain itself, for it is worked on exactly the same principle. A method such as this will not only prove itself to be a practicable way of keeping one's accounts, but the pages will always be valuable for purposes of reference. For instance, we may, by looking up a date, see at once what the price of eggs or fowls was at the time. Or the page will immediately show when the first ducklings were marketed, how the cost of food compared with the receipts during any given periods and other important matters.

---

* From "The 'Utility' Poultry Keeper's Record and Account Book," by A. Tysilio Johnson

When trap-nesting, or pedigree breeding is practised the charts supplied by the makers of trap-nests will serve the purpose of recording each bird's eggs daily, but a set of duplicate charts, included in the general account book, is always desirable in case the other set may get spoilt or lost. The great majority of poultry-keepers, however, as they do not take individual records, may be content with a simpler way, consisting of a carefully kept statement of the eggs laid each day. If several breeds or detached flocks are possessed, it is desirable, for the sake of comparison, to keep an account of each one's eggs separately, the various totals being taken monthly. The number of birds in each pen or flock must, of course, be stated on the page for use as reference and to enable one to ascertain the annual average production per hen.

A Hatching Record is absolutely essential to enable one to keep account of all eggs "set," whether in incubators or under hens. In this record, too, must be included the date of "setting," the breed, date due, number of eggs unfertile, addled, broken or otherwise rendered useless, the number of chickens hatched and, if they are toe-punched or marked in any way—a description of the identification should be given at the time in a column provided on this page. A place here for remarks upon the state of the weather, or other circumstances likely to affect the hatching, will be found most useful for comparison and future guidance.

(*Example No I*) RECEIPTS

Date	Sundries		Eggs sold		Fowls sold		Ducks sold		Geese sold		Turkeys sold		Total
	Description	£ s d	No	£ s d	No	£ s d	No	£ s d	No	£ s d	No	£ s d	£ s d

(Copyright)

When a special feature is made of selling sittings of eggs or day-old chickens, or both, it is advisable to have a separate place in the account book for these, which will not only give the date, breed, quantity and price, but the name of the buyer. With this latter included one may be able to refer at once to the date of the orders' despatch (which is always useful in the case of any claim for the return of unfertile eggs, or for chickens dying in transit) and to trace one's stock whenever occasion should arise. For the sake of convenience the amounts received for sittings and day-old chicks sold may be totalled each month and transferred to the foot of the general account (*Example No. I.*) and in like manner any losses incurred here or during hatching should be totalled each month and given under "Sundries" in *Example No. II.*

The absolute necessity for a Stud Record is acknowledged by every breeder of prize or pedigree stock, and it may find a place in the account book. It should contain a brief description of all stock purchased or sold, the date of the transaction, price paid or received and the name of the buyer or the seller as the case may be. A record such as this is just as essential to the breeder of poultry, or it should be, as it is to that of dogs or race-horses.

(Example No II) EXPENDITURE

Date	Sundries		Eggs bought		Fowls bought		Ducks bought		Geese, Turkeys, etc , bought		Food	Total
	Description	£ s d	No	£ s d	No	£ s d	No	£ s d	No	£ s d	£ s d	£ s d

(Copyright)

Finally, one must not omit to keep a statement of the amount of produce used in the household and to credit the poultry with its fair market value. One need not be finnicky and worry over the value of a stray potato peeling or a bucketful of house scraps, but the whole success of the undertaking must depend upon the accounts being methodically entered EVERY DAY. On reading the above, one may think that a poultry-keeper's business is a very complicated one—and it is. But the keeping of the accounts in the way advised, supposing a proper book be provided for the purpose, is really a very simple matter and not nearly so dreadful as it sounds.

Only one thing remains to be added, and that is the question of the Balance Sheet. *Example No. III.* will explain to the novice the main features of this important part of one's bookkeeping—the page which decides his fate for good or ill. Many poultry-keepers balance up their books at the end of December and again in June, and the six-monthly arrangement is generally to be recommended. But whenever the books are opened a careful valuation of all live and dead stock must be made and the same must be repeated when the books are to be closed. In doing this the value of the live stock should, in most cases, be based upon what it would fetch at a compulsory sale and ten to twenty-five per cent. must be deducted for depreciation from the cost prices of appliances, or dead stock, according to their condition. And, presuming that poultry are not the only stock kept, a fair proportion only of the labour and rent expenses should be entered.]

(*Example No III*) BALANCE SHEET

(Half Yearly)

Dr.	£	s	d	Cr	£	s	d
To Valuation of Stock, Jan 1 . ..	100	0	0	By Valuation of Stock, June 30	135	0	0
„ Eggs bought..	3	10	0	„ Eggs sold	17	10	0
„ Fowls „	5	15	6	„ Fowls „	14	0	6
„ Ducks „	1	10	0	„ Ducks „	12	10	0
„ Geese,etc „	4	12	6	„ Geese „	4	0	0
„ Food „	20	6	3	„ Turkeys , ...	5	10	0
„ Sundries „ and Deaths	3	0	0	„ Sundry receipts . ..	7	15	0
„ Rent and Labour (see note) .. .	30	10	0				
Balance .	27	1	3				
Total	196	5	6	Total	196	5	6

ADDLED. Applied to an egg which has decomposed through the death of the germ within (*see* "Eggs, testing.")

AGE, FOR BREEDING (*see* "Breeding.")

AGE, FOR LAYING (*see* "Breeding, age and egg production.")

AGE, LIMITS (*see* "Mating.")

AGES AND WEIGHTS (*see* "Marketing.")

AGRICULTURAL COLLEGES (*see* "Instruction.")

AGRICULTURE, BOARD OF (*see* "Instruction.")

AIR-CHAMBER. A space between the lining membranes at the broad end of an egg (*see* "Eggs, structure.")

ALIMENTARY CANAL (*see* "Digestive process.")

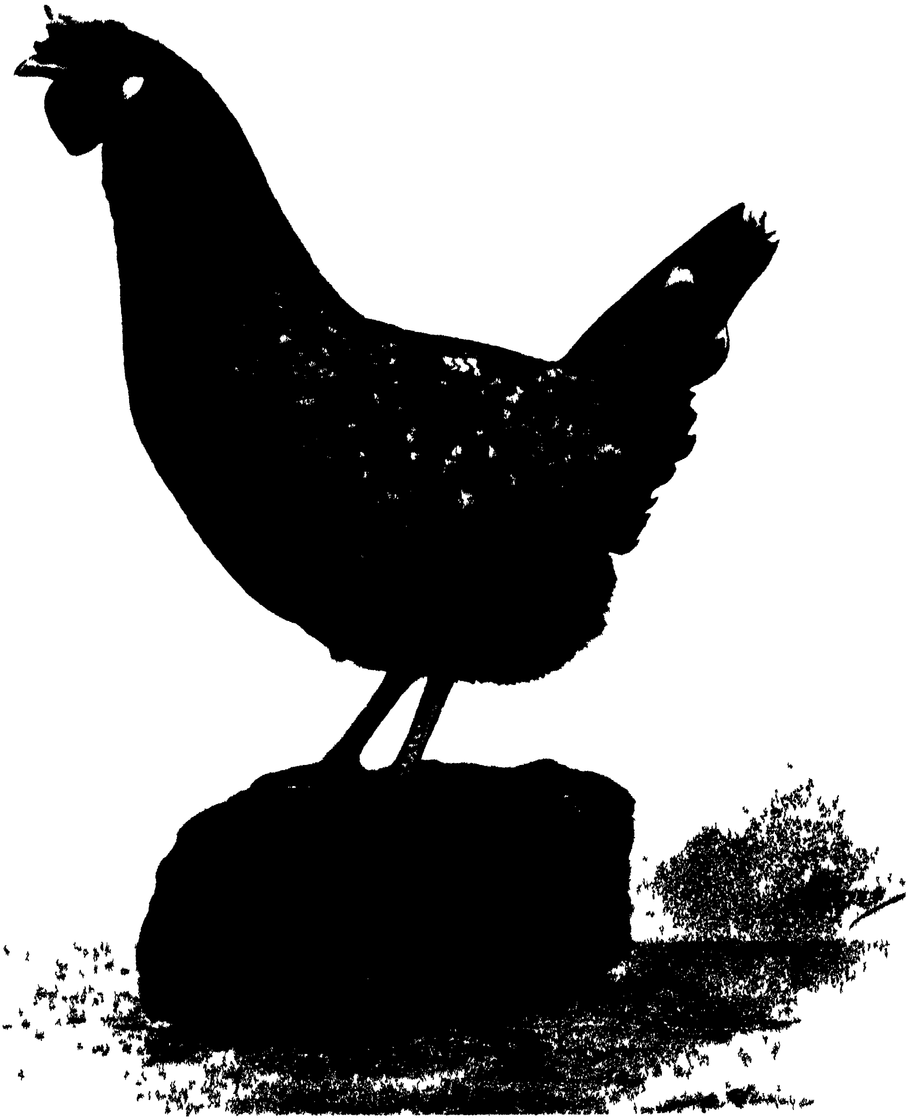
ALLANTOIS. A temporary appendage of the alimentary canal, used as a respiratory organ during the development of the embryo (*see* "Incubation, development of embryo.")

ALLOTMENTS (*see* "Small Holdings.")

AMATEUR POULTRY KEEPING. The word amateur may be a misnomer in connection with poultry keeping, for it is generally used to indicate those who embark in a sport or hobby without regard to personal profit, and as a rule poultry-keepers set out to make as much profit as possible, even if they only possess limited accommodation. On the other hand, there are wealthy fanciers who care little for profit, and probably make none, owing to their heavy expenses, who would on no account be classed as amateurs, because they employ expert poultry-men and win many prizes, so that we may state at once that the classes we include under the above heading are the beginners, or novices, as they are usually called, and those who, having scanty accommodation, keep a limited number of fowls, either for exhibition or utility purposes, but in the hope of making them pay a little more than bare expenses.

The majority of the most successful breeders of the present day have com-

PLATE No. 3



Single Comb Ancona Pullet.

(Bred by Mr. Beresford Webb, specialist non-exhibiting breeder of Single and Rosecomb Anconas, [illegible], South Godstone, Surrey.)

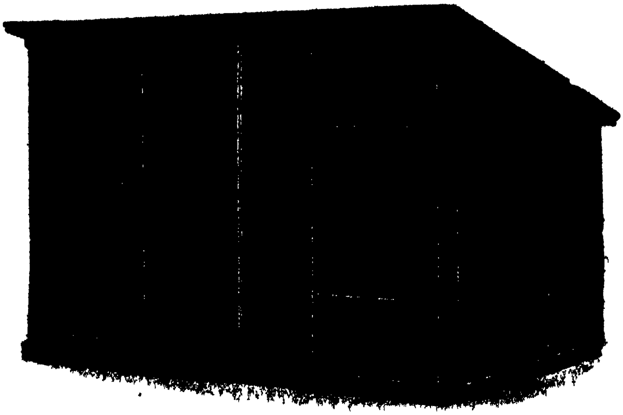
menced as amateurs in a small way, for though his opportunities may be few, the beginner who sets out to learn by practical experience enjoys a great advantage over those who rely upon books and newspapers and commence poultry-keeping upon a large scale with a deal of theory, but no practical knowledge and experience to back it up. Men who are now hailed as the most successful breeders of their particular varieties have started by keeping a few fowls and becoming enthusiastic, have gradually extended their operations and used the experience they have gained to improve their stock. So that amateurs or novices need not be ashamed to commence in a modest way. It is, indeed, the best plan for those who have no experience of poultry, for lessons sometimes have to be dearly bought, and those who are liable to make mistakes are better off when they only possess a few fowls to suffer the consequences. Moreover, a poultry-keeper has better opportunities for studying the individual habits of fowls and becoming enthusiastic about their management when he has only a limited number to look after. The amateur with limited accommodation, who takes up exhibition poultry-keeping is naturally handicapped, since he is unable to breed so extensively, rear his chickens to such size, and keep his show birds in the same condition as the fancier who is able to give his stock a wide range. For that reason many people in such circumstances take up bantams, although there are one or two large breeds which are more suited to breeding in confined spaces than others. One of these is the Minorca, which does not suffer in confinement, is not spoiled where the atmosphere is smoky, as lighter coloured fowls would be, and breeds sufficiently true to type to give the small breeder a reasonable chance of hatching two or three winners out of a comparatively small crop of chickens. The black Leghorn is another good breed for the small amateur fancier, and probably more fine specimens of this breed have been produced in confined poultry-yards during the last few years than any other. These small, active black breeds seem particularly suited to the requirements of the fancier who must keep his stock in close confinement, and they have the additional advantage of being economical and productive. Poultry-keeping on a small scale for amateurs or novices has been greatly upon the increase during recent years. and there is no other branch in which such large profits per head can be made when the management is good and economy is practised in feeding by utilizing household scraps. There are thousands of householders in town and country who might utilize spare ground and outhouses and reap a substantial profit, besides supplying the house with fresh eggs, by keeping a few fowls, if only the matter were better understood. But, unfortunately, a great many people have but a remote idea of what a fowl is, and many others dislike the trouble of attending to live stock. But, on the other hand, there is a very large number of persons who have tried to keep fowls for profit and have failed for various reasons, or who would gladly do so if they knew the way to go about it. Some have set out with the apparent idea that the more fowls they keep the better their chances of success, and this is a very common mistake among amateurs, those who have been successful with half a dozen hens wanting to double the number in the belief that they can double the profit as well, without increasing their accommodation. Then a great many more people annoy their neighbours by keeping a cockerel when there is no necessity to do so, for a male bird has no influence whatever upon egg production and is merely necessary when fertile eggs are required. Yet in spite of this fact scores of poultry-keepers who have no more accommodation than a backyard and therefore no opportunities for keeping more than half a dozen hens and for rearing any chickens, would consider their arrangements incomplete unless they kept a cock to make a noise and eat food and occupy space that might have been devoted to a more worthy purpose. Then again, errors in feeding are frequently the cause of failure and loss. No heed is taken of the fowls' actual requirements, but they are given as much food as they will eat, especially when household scraps are plentiful, with the result that, having few opportunities (if any) for taking exercise, they soon become too fat to lay and develop liver complaints.

An Amateur's Poultry.Run.

These mistakes are especially regrettable because there is an excellent opportunity for those who are inclined to interest themselves in the matter, to make a few fowls pay handsomely by keeping them entirely for laying purposes in a small sheltered run, and this plan appeals particularly to suburban and town dwellers, who are obviously unable to undertake the other branches of poultry-keeping which demand more space. Success in this case depends largely on personal attention, since cleanliness is of great importance to fowls kept closely confined, together with suitable quarters, and selection of young fowls of a likely type for laying in confinement. We may first of all consider the quarters, which should be situated in a sheltered corner of the yard or garden, and should consist of a house and run under the same roof. We stipulate for the covered run, because it is impossible to keep fowls in good productiveness in such close quarters when they are exposed to the weather. Moreover, an open run is turned into a quagmire or a mud-heap in wet weather, so that the fowls are unable to take any exercise, whereas in a covered run dry litter for the birds to scratch among is available in all weathers. The back and ends of the run should be boarded up, as well as 18 inches in the front, which will keep the place dry, especially if the surface inside is raised a little so that water does not drain into it. The house should be well ventilated, a sliding shutter in the front being useful, but the design is of no great consequence so long as there is ample room for the fowls. As a rule, these combined houses and covered runs are built in the lean-to style, with a wall or building for the background, and in that case it is preferable to have the highest portion of the roof in front, and sloping down to the back, for the sake of more air and light, though a gutter must be provided to carry off all water.

The number of fowls to be kept in such quarters must depend upon the area. In a run 12 ft. by 6 ft., with a house 4 ft. by 6 ft., half a dozen hens could be kept very comfortably and in a healthy condition, provided ordinary precautions were taken, but if we kept a larger number we should not obtain such satisfactory proportionate results. The backyard amateur will invariably do better by not stocking his run to its utmost capacity, and he must also take into consideration the amount of household scraps he can obtain, for though he may, by this means, feed half a dozen hens very cheaply and reap a high rate of profit, he will reduce the profit per head considerably when he keeps a larger number and has to buy food for them. The most suitable type of fowls for this particular purpose are the lighter, non-sitting breeds, and among these none acquits itself better in confinement than the Minorca, whose eggs are large and laid in generous numbers all the year round when the conditions are favourable. Either this or the black Leghorn will give excellent results, especially if birds of good laying strains are kept.

As breeding is out of the question in such instances, it becomes a question how to maintain and renew the stock at lowest cost, and there can be no doubt that the most economical plan is to clear out the old birds every year or every other year and start again with pullets. It certainly would not pay to keep a hen after her second laying season, and as in these particular circumstances we believe it to be good policy to force egg production, we consider it safe to have fresh young stock every autumn, because a hen that has been forced during her first season seldom gives such satisfactory results during her second season as a hen that has not been forced. Besides, the conditions under which the birds are kept are not conducive to the maintenance of health for any length of time, and we have found that many prolific hens have gone wrong in their second season. Supposing, therefore, that one purchases half a dozen March or April-hatched pullets during the early autumn. These should be laying by October, and if they come from good laying strains (and we may add here that it pays to give a little more for birds that have been bred by genuine utilitarians) and are managed properly, there is no reason why they should not lay throughout the winter, with brief intervals, and on through the spring and early summer. Such birds will invariably moult earlier than those that have their liberty, and if the amateur intends to renew his stock every year he must consider their disposal before they begin to moult. He will do well to sell them alive if he can obtain 2s. or 2s. 3d. each, but otherwise he should endeavour to get them fat about the end of June and either sell them as old hens for the table, for which they may realize from 1s. 6d. to 2s., or consume them himself. Personally, we consider that if a hen is boiled for two or three hours and then



The Reynolds House. (*Meech*)

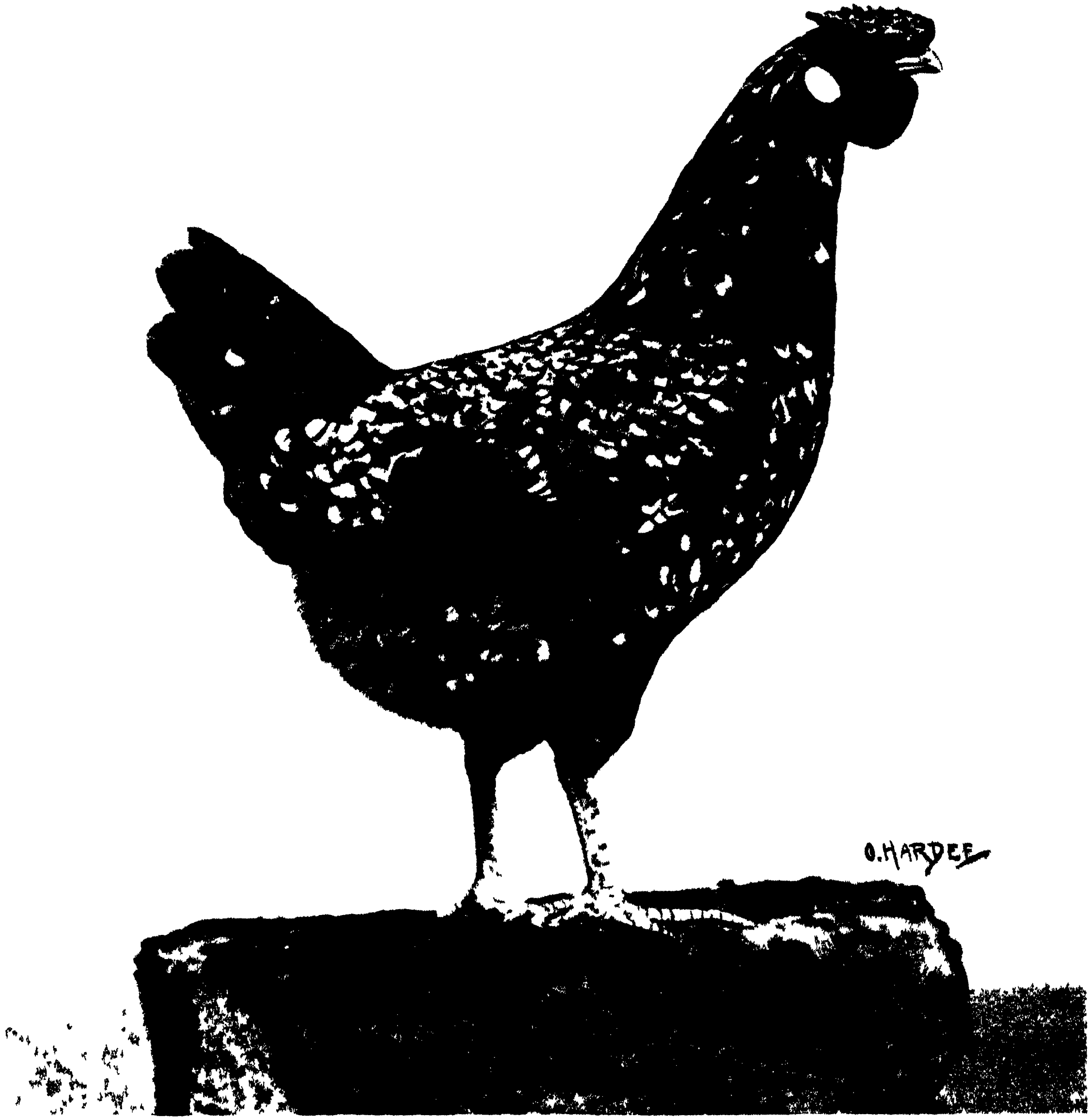
browned in the oven she is worth more than 2s. for one's own family table.

However, it will be seen that when one has had a season's laying out of a hen one must sell her for considerably less than she originally cost, and buy a young bird in her place again at a great advance. But the profit comes in with the eggs she lays, and we can fully recommend this as a sound and profitable business plan, for the eggs are, or should be, produced at a low cost. If all the food given to the hens had to be purchased on purpose the profits would barely leave sufficient margin to cover the discrepancy between the laying and selling price of the hens, but it is the policy of the amateur in such cases to rely to a considerable extent upon household scraps. Bread, vegetables and such things should be put into a stock pot and soaked overnight. In the morning they should be warmed up, liquid should be strained off, and sufficient sharps mixed with them to make a fairly dry mass. We prefer to give scraps of meat separately, and bones of all kinds can be given to the birds to pick at. If the household scraps are given in the morning, meat and green food (of which a daily supply must be provided) can be served at mid-day, and for the evening meal it is advisable to give hard corn, such as wheat and oats, though if scraps are plentiful they may comprise half the feed, so long as the birds have some corn to keep the digestive organs in activity. Grit must always be at hand, together with oyster shell or lime in some shape or form, for birds in close captivity have no chance of finding these necessities for themselves, Hard corn should be scattered among the litter, in order to encourage the birds to scratch, but the soft food is better fed in a trough, so that it may not be fouled. Judgment must be used, however, in proportioning the quantity, as it is very easy to overfeed birds kept under such conditions.

We have already referred to forcing hens for egg production, and by that we mean the use of stimulating food. Household scraps have that effect, especially when there is meat among them, and poultry powders or ovary tonics may be used in moderation during the winter. Houses and runs must be kept very clean, litter being changed frequently, for only in this way can the birds be kept in good condition and the danger to public health through the spreading of disease germs be avoided.

AMERICAN BREEDS. The services that have been rendered to the poultry industry by the breeders of the United States are not confined to the introduction of many new methods and appliances that have revolutionized the utility side of the industry. The art of breeding has been well understood for many years, and American fanciers have to their credit two of the best and most popular of modern composite breeds, the Plymouth Rock and the Wyandotte, which, with their numerous sub-varieties, are so widely kept in this country and in all parts of the world. It is worthy of note that in creating their new breeds the Americans have given full consideration to utility characteristics. In the United States no breed can stand upon fancy points alone. It must be a prolific layer or a serviceable general purpose fowl, and as the originators of new varieties have first of all sought to produce a sound, sensible and useful type, and have then perfected its external characteristics, the result is that in the two breeds named above we have fowls that would have attained popularity by their useful qualities, even had they possessed no distinctive merits for exhibition purposes. They are hardy, active and excellent layers, and if they do not rank as first-class table fowls in this country, that is because our standard of excellence for table poultry differs so materially from that of the American breeders. It will be observed that in the Plymouth Rock and Wyandotte,

PLATE No. 4.

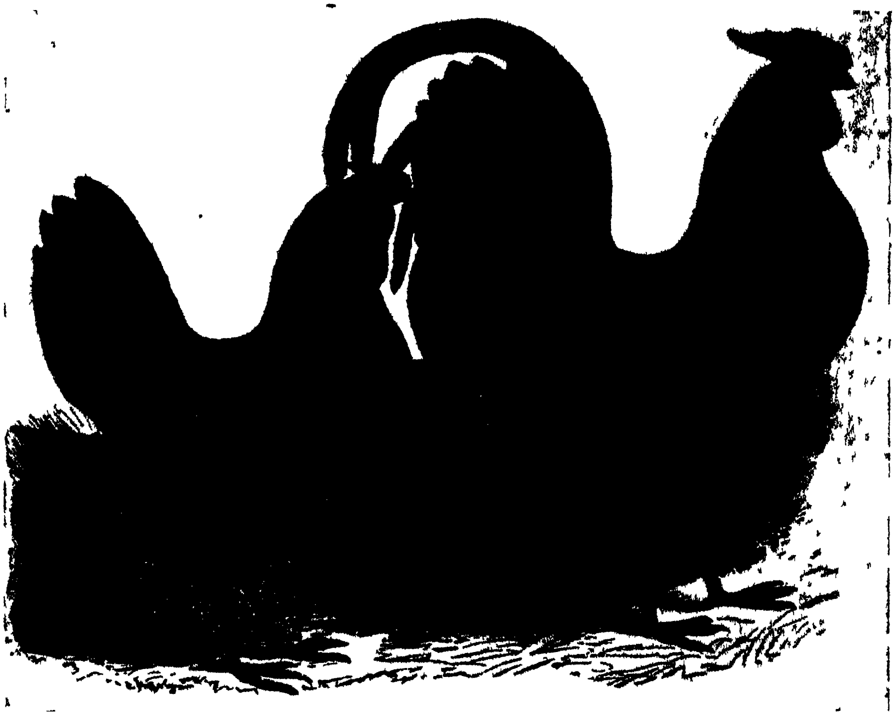


Rosecomb Ancona Pullet.

(Bred and exhibited by Mr. H. T. H. Way, Frogmore, Milton under Wychwood, Oxon.)

Winner of 1st Gerrards Cross, V.H.C. Club Show Leeds, 4th Crystal Palace (International), etc.

the Rhode Island Red (perhaps their best table fowl) and, in fact, in all their creations, the Americans have adopted the principle that yellow legs are the hall-mark of a first-class general purpose and table breed, whereas English and European breeders place a yellow-legged table fowl in an inferior grade. In this respect one cannot help thinking the Americans will, in course of time, amend their views, for when a yellow-legged and dark-fleshed fowl is placed alongside a white-legged, white-fleshed bird, such as are in demand in our home markets and for which higher values are to be obtained, the superiority of the latter in point of attractiveness is very obvious. However, the Americans have stood firmly by their yellow-legged breeds from first to last, and though our Orpingtons have found some favour in the United States, nothing can compare for popularity with the Plymouth Rocks, Wyandottes, Rhode Island Reds and Leghorns. The latter must not be regarded as an American breed, although fanciers in the United States claim some credit for bringing it out. It appears to have found favour over there before it reached this country, and it has since become so generally popular as almost to be considered a native; whilst the rose-combed varieties, which have given some wonderful results in laying, may actually be regarded as American productions. The fanciers of the United States also took a prominent part in exploiting the Brahmas and Cochins, and in their modern productions they have utilized these two breeds to a very large extent. Indeed, the yellow legs of these Asiatics may be regarded as the foundation of what may be considered the American principle of breeding fowls with yellow legs.



A Pair of Dominiques as they appeared in the early 70's.

From time to time new types of more or less distinctiveness have been introduced in America, and have been given names that in many cases were more wonderful and certainly more peculiar than the fowls. But among all these only a few call for comment, and the first notable American introduction was the Dominique, a variety with cuckoo or barred plumage, rose comb and the usual yellow legs, the body being rather long and not unlike the Cuckoo Dorking. This breed is not kept in England at the present time, and the same may be said of the Black Java, which made a little stir in this country at one time, and has since been utilized by some breeders in producing black Wyandottes. The Java, which had a single comb, thick at the base and with few serrations, differed from the majority of American breeds in having black legs; but the yellow tinge was apparent in the feet, and the legs of old birds turned to a yellow shade, so that there still remains the marked difference between the American and English notions, for in the Langshan and black Orpington the soles of the feet and toe nails show the influence of white legs.

The Barred Plymouth Rock stands by itself as one of the best modern varieties ever produced, and it has been followed by the Buff, the White and the Black. But the Wyandotte has been an even greater success, to judge by the number of its sub-varieties, the Silver-Laced being followed by the Gold-Laced, the White, the Buff, the Partridge, the Silver Pencilled, the Blue-Laced, the Buff-Laced, the Columbian and the Black, and all these varieties, many of them favourites here and in all parts of the world, originated in America, and in many cases obviously owe their parentage to the Brahmas and Cochins.

Less popular, but none the less useful, must be classed the Rhode Island Red, a hardy, long and deep-breasted fowl, with either a single or rose comb, plumage that might be likened unto that of a very dark Buff Rock, with black tail, and the inevitable yellow legs. Among other more or less distinctive breeds that have met with some measure of success in America may be mentioned the Jersey Blues, with Andalusian plumage, Plymouth Rock type and a single comb, and they are notable as being perhaps the only American introduction with dark legs and white skin. Perhaps that is the reason why they have been so little appreciated. The Sherwood is a large and useful breed with white plumage, single comb and slightly feathered legs, and the White Wonder fowl apparently differ only in having rose combs. A breed called the Klondyke, apparently a cross between the Silkie and the White Leghorn, was exploited a few years ago, but like many others it possessed little or no merit.

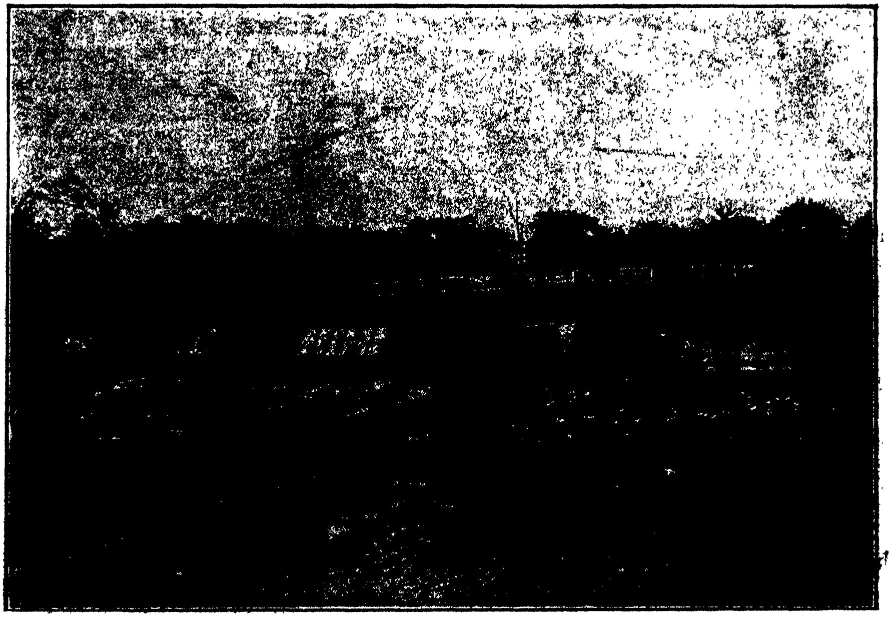
AMERICAN BRONZE (*see* "Turkeys.")

AMERICAN POULTRY FARMING. While there are several points of dissimilarity between British and American poultry-keepers they possess a good deal in common, and their differences are neither so striking nor so varied as many seem to imagine. A somewhat prolonged tour through the leading poultry centres of America gave the writer an excellent insight into the methods adopted and the success achieved, and after weighing up very carefully all the pros and cons, he is led to believe that in some respects America leads the way, while in other equally important directions Britain is a long way ahead.

The all-prevailing breeds in America are the Plymouth Rock and the Wyandotte, both of which originated in that country. They may be termed the national breeds, as they are everywhere to be found. If anything, the former is the more popular of the two. It is estimated that a quarter of the poultry in the States consists of one of these two varieties. White Leghorns are extensively kept in certain districts, being used for egg production, and for killing when eight or nine weeks of age as "squab broilers." The Plymouth Rock and Wyandotte are used for all and every purpose, principally for egg production during the winter, and for marketing, either as soft roasters or as large broilers. The colour of the flesh is not considered a point against them for table purposes, as in

America yellow meat is preferred to white. It has an extremely strange appearance to see nearly all the birds exhibited in the shops and markets a bright yellow colour, but in every town, with the exception of Boston, there is a more ready sale for birds with yellow flesh. In many cases, the meat has quite a greasy appearance, such as we generally associate with yellow flesh, but this does not seem to count against them so far as their value is concerned. White eggs are always preferred to brown, exactly the opposite to this country, and this partly explains why the White Leghorns are rising somewhat in popular favour. There is just one town, however, where tinted eggs are preferred to white, namely Boston. This city prides itself upon its English tastes, and whatever is in demand in this country is certain to find favour there. This accounts for the preference shown for white flesh, and brown eggs.

Some of the largest poultry farms in the world exist in the United States, and it is probably owing to them that we are so used to hearing the claim that American poultry-keepers are the most successful in the world. At one duck farm the writer visited, there were, the day of his visit, over 35,000 ducklings on the place, which were being marketed at the rate of four hundred a day. From the ducklings killed on the farm, about two-and-a-half tons of feathers were obtained annually, which realized over £500 in their rough, unprepared state. There were forty incubators at work, with a capacity of 18,000 eggs. At another farm there were over 25,000 birds, and at a third over 18,000. At an egg-laying farm there was a flock of over 5,000 hens, all White Leghorns; and lastly, at a broiler plant in the West, there were raised in 1907, a total approaching 80,000 chickens, the accommodation for which was erected at a cost of £40,000. It is when we hear of figures like the foregoing that one is liable to judge the whole industry as in a marvellous condition, but it must not be forgotten that such establishments are few and far between. These huge concerns are not advocated in this country, as the future of the poultry industry in England depends in no small degree upon the small farmers and cottagers, who keep perhaps but fifty to two hundred hens, rather than upon the large plants, of which mention has been made. We have, it is true, some extensive establishments scattered throughout the country, but while under certain con-



View of an American Duck Farm.

ditions they may prove a success, yet, as a general rule, they are liable to be failures.

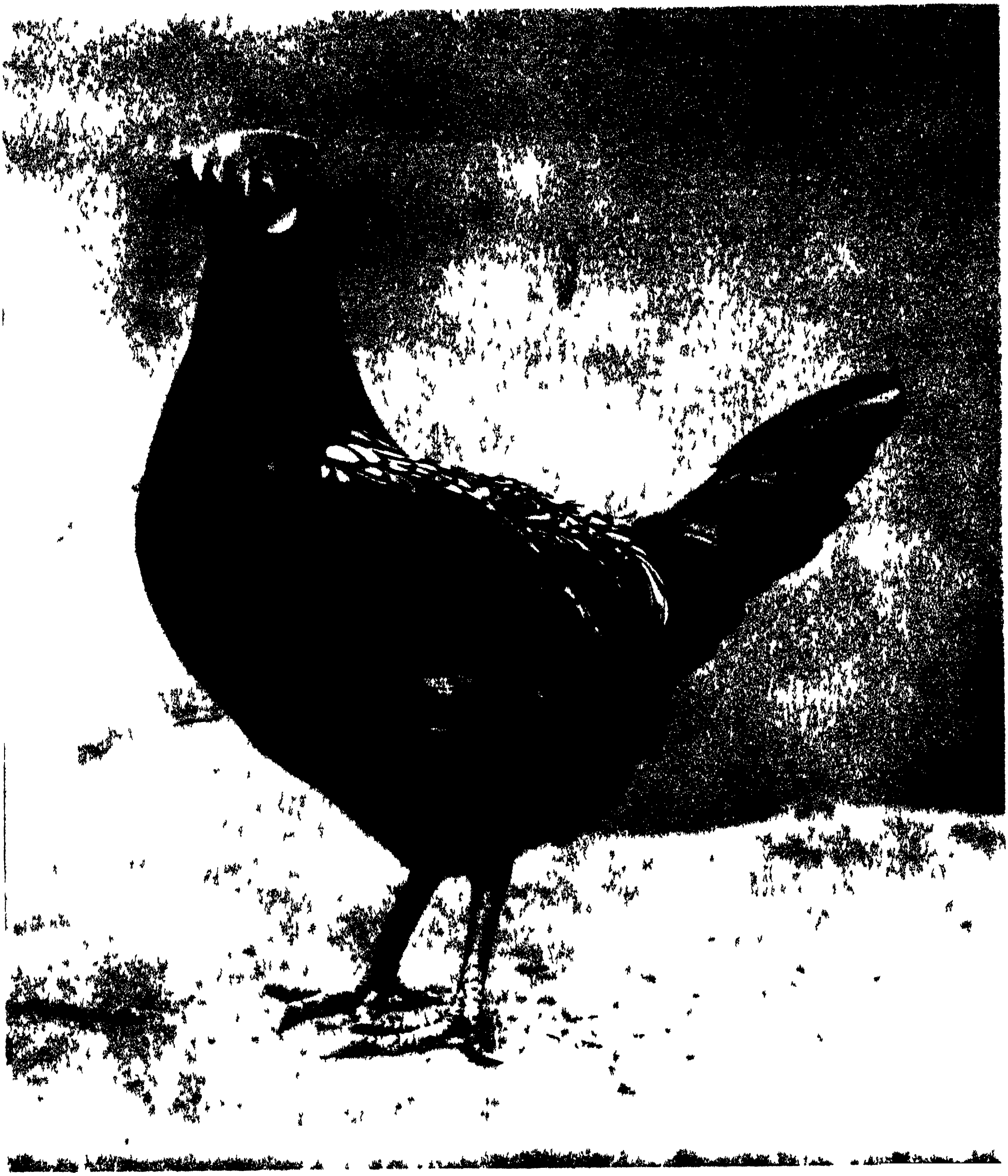
Apart from the large size of the plants, and the extensive use of maize for feeding purposes, the houses and general management of the stock are greatly similar in the two countries. There are many differences in detail—this is to be expected—but the general principles are much alike. The winters being considerably more severe in the States than in England, it is necessary to erect the houses more substantially; as for instance, with double walls. Such a thing is almost unknown with us, as we do not find it necessary, one thickness of inch boarding being quite sufficient to maintain a fairly even temperature during winter and summer. A very noticeable feature of the poultry industry in the United States is the extremely small amount of cramming that is done. In this country, all our best market birds are artificially fed and crammed, but it appears very little is done in this direction across the water. From the writer's conversations with the poultry dealers in the New York and Boston markets, he found that the birds which had been "finished" were highly appreciated and eagerly sought after, besides which, a higher price was obtained. It seems strange that while this is the case, those supplying the markets do not lay themselves out for the production of really well-fattened stuff.

In one direction we are far in advance of America, namely, as far as facilities for educational work are concerned. For many years in the United Kingdom a great deal has been done by the various public bodies in providing lectures and demonstrations on poultry culture. The good that has been done by these means is incalculable, and there is no doubt that we owe the present success of the industry in a very large degree, to such-like work. In the United States very little has been done in this respect, save an occasional lecture at a farmers' institute. It will be a much more difficult matter to organize a system such as we have, in the States, owing to one thing, to the great extent of the country; but undoubtedly much good would rapidly be accomplished by such means.

AMNION. A temporary membraneous development of incubation, the function of which ceases with the completion of embryonic development (*see* "Incubation, development of embryo.")

ANÆMIA. Anæmia (bloodlessness) is really nothing more or less than a condition of atrophy, or defective circulation, leading up to defective nutrition. It may arise from any one of numerous causes, and affects old and young stock alike—though principally the latter. Chickens are particularly subject to anæmia, especially when kept in close confinement. Many of the brooders or foster mothers sold are insufficiently ventilated, and the result is that the chickens reared in them get an insufficient supply of oxygen: put into other language, the blood is only imperfectly aërated — consequently the food which passes through the digestive organs and meets the oxygen (or *should* meet it) in the blood is not fully used up, and defective nutrition—atrophy or wasting—results. This leads up to the condition known as "going-light" or consumption. "Going-light," it is true, may be due to liver complaint or to lung or intestinal disease also—but it is closely connected with anæmia, and after all a pure rich supply of blood means, in general, perfect health. Much depends, apart from fresh air, upon the method of feeding followed. Many poultry keepers make a great mistake in giving starchy foods such as maize, rice, etc., the effect of which is merely to overheat the system instead of to nourish it. Careful dieting, abundant fresh air and exercise, and also attention to green food and grit supplies, will do more than anything else to keep birds strong and healthy. There are

PLATE No. 5



Andalusian Pullet.

(*Exhibited by Miss K. B. [illegible], Rimington, Clitheroe.*)

Winner of Challenge Cup, Challenge Bowl, Special and 1st Club Show, Manchester, Special 1st Royal Lancashire, 1st Skipton, 1st Bingley, 1st Special Lancaster, etc.

also various tonics, amongst the very best being Parish's chemical food, a little of which given occasionally in the drinking water will work wonders. This food contains iron—and with poultry there is nothing to equal iron as a blood tonic. Given in conjunction with phosphates, as in the form now recommended, it acts very well. Blaud's iron pills are also good for debility in poultry.

ANATOMY. The skeleton of a fowl strikingly resembles in many respects a skeleton of a man. There is no double row of teeth, but there are two mandibles of the beak by way of compensation. Practically there are the same parts to the skeleton of a fowl as to those of men and animals, but they are modified to meet the particular requirements of environments of a bird. The wings correspond to the arms of a man or the forelegs of an animal; the toes are capable of contraction for purposes of flight—indeed the whole body is adapted so as to enable its possessor to make rapid progress through the air. The chief point is, of course, the presence of feathers covering the whole body except the legs (which are covered with scales). The uses of feathers are mainly to keep the bird warm (the temperature of a fowl is about 104 degrees Fahrenheit—six degrees higher than a normal temperature of man)—and to aid flight. It is interesting to notice in the skeleton of a fowl the lightness of the bones relatively to those of beasts. This is what we find in all birds. Birds were intended to fly, and so Nature has provided them with a frame which will assist their easy and rapid progress through the air. All bones, whether of beasts or of birds, contain air spaces, the object of which is to circulate oxygen to keep the bones healthy. But the bones of a fowl or of any bird contain more of these air-spaces than do those of beasts, and not only does this fact explain why birds can fly more easily than a winged beast could fly, but it explains another curious fact, and that is, that broken bones heal more quickly in a bird than in a beast. There is a more extensive circulation of air through these air-cavities, and so the bones are encouraged to heal up at once. (As to this see further under "Accidents.")

Coming now to the internal organs of the fowl we may classify these into three divisions, namely, respiratory, digestive and reproductive.

The respiratory organs are (1) the nostrils, through which the air first enters, and where any solid particles are stopped and prevented from passing on to the lungs; (2) the trachea, or windpipe, which begins at the glottis or slit at the back of the mouth; and (3) the lungs. The windpipe traverses the neck, and when it reaches the body it divides into two channels, termed bronchi, which enter the lungs, one right and one left. These divide up into smaller bronchial tubes. The lungs themselves are situated close up to the ribs, between the shoulders. They are covered by a skin or membrane (the pleura).

There are also a number of small air-sacs communicating with the bronchial tubes, and also communicating with the bones. They lie, so to speak, between the flesh and the bones, and as the muscles of the ribs relax and the trunk expands, these air-sacs inflate themselves; when the rib muscles contract again the air-sacs are compressed, and the air, which has circulated itself through the body, is forced out again. This is how respiration is carried on, and it shows how close a connection exists between respiration and digestion—the oxygen of the air meeting the carbon of the food in the blood.

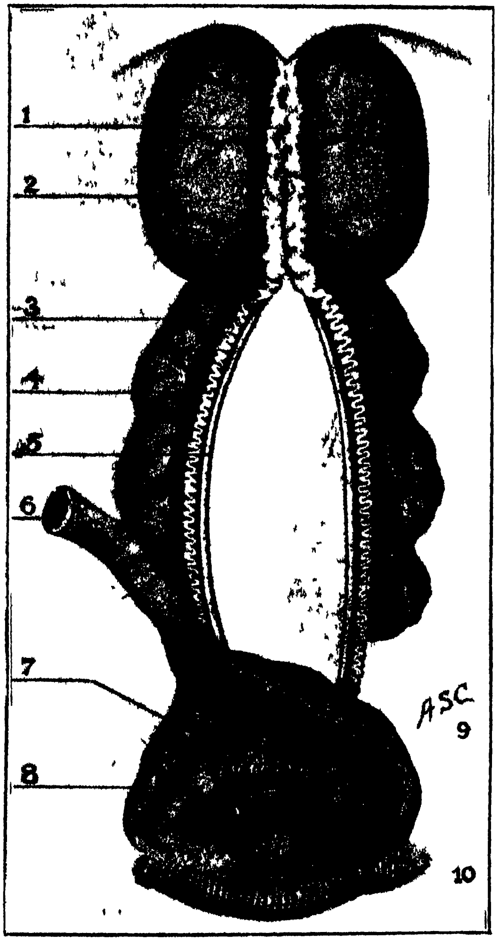
Coming now to the organs of digestion we have first the crop, which lies at the bottom of the gullet. Here the food is stopped in its crude state just as it has been swallowed, and here it undergoes the first of the digestive processes. A fowl in the course of its daily wanderings, swallows a very mixed lot of things, corn and seed, grass and other herbage, soft solids like bread and meal, indigestibles like stones—all pass together into its crop, where a softening process is started, though of course the juices make no impression upon the stony substances. The food then passes through the proventricle or stomach—a comparatively small organ in the fowl—and so on to the gizzard, the last organ of preparation where the indigestibles are retained whilst the nutritives pass on to be acted upon by the bile and so into the blood.

The reproductive organs (testes) in the male are situated high up in the abdomen, near to the kidneys. One only, as a general rule, is fully developed. There is nothing of consequence to be said on this topic beyond this—that the operation of caponising now extensively practised is by no means dangerous when performed in a skilful manner. We may pass on, therefore, to the female organs. The egg organs of a hen consist in effect of two organs only—the ovary and the oviduct. There are at first two ovaries, which can be traced even in the developing chicken before it is hatched; but, as a rule, only the left one develops to maturity, the right one remaining in its embryonic state. The mature ovary is an unevenly-shaped bag, to which are attached the ova or eggs.

American Poultry Journal.

Organs of a Fowl.

These develop one by one, become detached, and slip into the oviduct—a long, twisted tube, terminating in the cloaca or cavity inside the vent. The oviduct consists of two parts. The first portion of it through which the egg passes is more delicate in structure—thinner-walled—than the second portion, which is strong and thick-walled. It is in the former that the white or albumen is deposited, and in the latter the shell. An egg takes from three to five hours to pass through the first portion, and from fifteen to twenty hours to pass through the second stage. It is then complete and ready to be laid. The tints of brown which the shells of many eggs show are due to pigment deposited also from the blood. Certain authorities consider that there is a connection between the colour of the shell and the length of time an egg takes to pass down the oviduct. (*See also* " Post-Mortem.")



American Poultry Journal

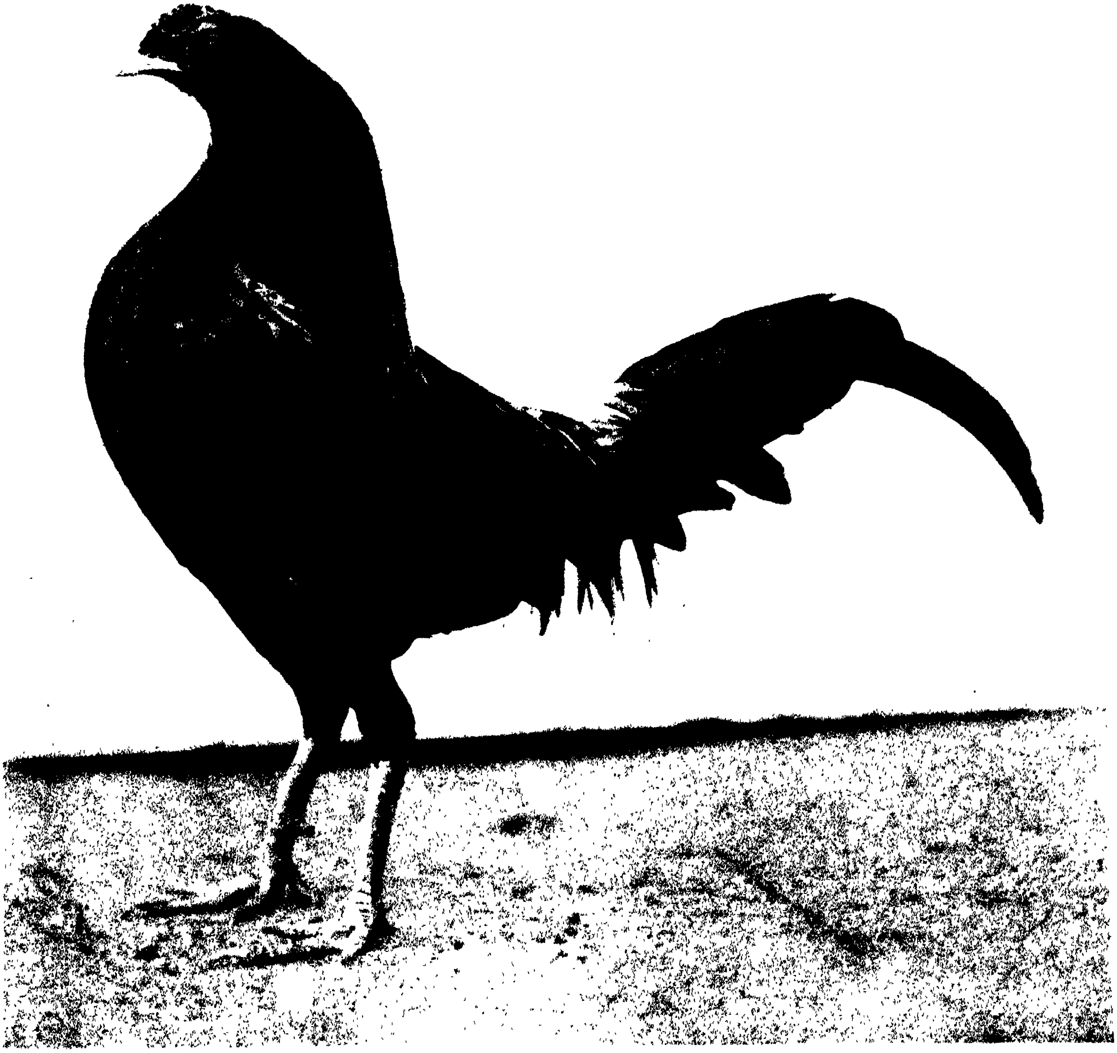
Organs of the Male Bird.

1 Epididymis. 2 Testicle 3 Kidney 4 Vas Deferens 5 Ureter. 6 Rectum 7 Opening of Ureter. 8 Opening of Vas Deferens. 9 Cloaca 10 Verge of Anus

ANCONA. This variety first appeared in England in the early fifties. At that time the birds presented a very mongrel appearance. In Italy, whence it was imported, there are different varieties or sub-varieties besides the one with which most of us are familiar, *viz.*, the black and white, all of the same type, but variously coloured, some white, others brown and red. This accounts for the brown or copper-coloured feathers which often appear on the neck hackles and wing coverts of the present-day cockerels, though it is more often thought by those not intimately associated with the breed that this is due to crossing with other varieties. It is strange that these brown feathers rarely appear in the pullets. Little appears to have been known about the Ancona in England before the latter part of the last century. Doubtless the birds were kept by many for their unequalled laying qualities, but it was rare to see them on the show bench. The true Ancona is one of the most, if not the most, prolific layers extant. The one aim of an Ancona's life appears to be egg production. One item, which is an important factor to all who keep fowls for utility purposes, is that they require no forcing food to induce them to lay in autumn and winter. Anconas at any age require much less food than any other variety of fowl, and no greater mistake (from a profitable point of view) can be made than letting them have corn or soft food, *ad lib.*, unless, of course, they are kept in close confinement. It is estimated that a Minorca will consume about double the amount of food picked up by an Ancona, and a Minorcaized Ancona will eat nearly, if not quite, as much as a pure Minorca—in fact, they are the same in size and type—and this is just one of the many disadvantages of the crossing. As a table fowl the Ancona has few qualifications. The cockerels will rarely turn the scale at five pounds, and are rather difficult to fatten, and certainly not worth the trouble. The flesh, however, is exceptionally fine in quality, and possesses a distinct though slight gamey flavour, by which it can be readily recognised. To those who have the means to allow their birds an unlimited range the Ancona particularly appeals, for in this state it practically requires no food for six or eight months in the year, foraging contentedly in the hedgerows and fields, or round the corn or haystacks—for the smallest particles of food, about which few other varieties would trouble. No other fowl is nearly as active as the true Ancona. When selecting birds from a flock solely for egg production, it is policy to always pick out those which appear lighter in colour than the rest, especially in the under-fluff. These will probably (though it does not necessarily follow) be *true* Anconas. One should also look carefully for the pullets with upright tails and see that these are left behind, selecting only those which carry their tails, rather low. A deep "cushion" is not always the sign of a good layer, neither is a large bird a layer of a large egg. A pullet with a lap comb is usually to be preferred to one without. The cockerel to be selected should, unlike his mates, carry his tail rather high, and should possess, when fully developed, long, flowing sickles and plenty of neck and saddle hackles. He should also be light in colour, upright in carriage, with alert, active appearance. Preference should be given to a bird having white wings and tail, with perhaps black tips to the latter instead of a black tail. These remarks only apply to those who are in want of a bird purely for utility purposes, and who might not be able to detect a bird with foreign blood. Many show specimens may be of a good laying strain, and so may many birds whose under colour and plumage are black. A cockerel with a thick, fleshy comb and lobes should be carefully avoided. The first touch of cold weather and east winds will frost-bite his comb and render him

Single Comb Ancona Cock and Hen.

PLATE No. 6



Old English Black-Red Game Bantam Cock.

Bred and exhibited by Miss R. B Babcock, Rimington, Clitheroe.

Winner of 1st Birmingham, 1st and Special Carlisle, etc.

useless as a breeder for some time to come, if not permanently. The comb of an Ancona should be large—that is, it should be larger considerably than an Orpington or Langshan; but it should not be so large as to be of inconvenience to the bird, and in the case of the cocks should never lap—this is a very important point indeed. Of late years there has been a tendency among certain exhibitors to breed birds with "beefy" combs, much heavier than the birds can bear. Some breeders keep both the utility Ancona and the show Ancona almost like two separate breeds, and those who do should be preferred to those who keep show birds—*i.e.*, the "modern" Ancona—which they claim to possess both qualities, almost invariably taking show points only into consideration and selling their mismarked birds as "utility" specimens. While it is not necessarily impossible to have both qualities in the same bird, it is impossible to breed for both qualities with the same birds. Obviously then, it is quite out of the question to have birds first-class in both respects. When breeding for exhibition this is quite a different matter, and a much harder one too, assuming that the breeder does not wish to produce a Black Minorca with white tips to its feathers, but the genuine article—the true Ancona, bred up to the United Ancona Club standard. First, let it be borne in mind that it is not necessary to keep two pens of birds—one for producing pullets and one for cockerels—and this should carry weight when choosing a breed, for in many varieties two pens are absolutely necessary. A point should be made of selecting a cockerel and two or three pullets of medium size, all of which are a bit too dark in colour to do much good in the show pen. The under fluff and bases of the wing and tail feathers should be as dark as possible, and the legs and feet yellow, spotted with black—not pure yellow and not pure black. All the feathers should possess a bright beetle-green sheen, and the white tippings to each should be small, clear and V-shaped. The head should be rather large for the size of the bird, as also the comb; the latter should stand erect in the male bird and have no inclination to lap. Although size is a desirable feature to a certain extent in all exhibition specimens, plumage and type are far more important, and no judge with any real knowledge of the breed would—or should—allow a large, badly-mottled bird to be placed above a smaller bird possessing good mottling, colour, type, etc. Probably the quickest way to spoil the Ancona as a utility fowl is to breed for extreme size. Many strains of Anconas at the present day produce large, white eggs, averaging (when the bird is fully developed) two ounces or over. A brown or tinted egg in single comb Anconas is usually, in fact, some contend always, a sign of impurity. The hen which lays it may appear perfectly pure, but, in all probability, some of her ancestors—it may be many generations back—have crossed with a sitting variety. (*See Plate No.* 3.)

—— **ROSECOMB ANCONA.** This sub-variety was first introduced about 1900. Just how it was obtained cannot be definitely stated. Some strains show a distinct Wyandotte type, others Hamburgh, and of the two the latter are by far the better in appearance. The Rosecomb Ancona, unlike the single comb, often lays a tinted egg, which clearly points to the fact that some sitting variety was used in its production. It thus bears the distinction of being the only non-sitting variety that lays a tinted egg—a very strong point in its favour. At present Rosecomb Anconas do not appear to be as good layers as the single comb, but by trap nesting and careful selection there is no reason why they should not ultimately rank amongst the best layers we possess. (*See Plate No.* 4.)

ANDALUSIAN. This variety of our

domestic poultry derives its name from the province of Andalusia, in Spain, whence came the first specimens of the breed, which arrived in England in the year 1851. These pioneers of the race were very different in style from those birds we now know as Andalusians, the hens being smaller in size and very varied in colour, some of them having small erect combs. With a view to generally improve them, a cross with the white-faced Black Spanish was effected, which proved beneficial in a way. Subsequent importations were made and undoubtedly these were mated back to the Spanish cross, this amalgamation being the foundation of the present Andalusians, though Minorca blood has been infused now and again. Although particularly handsome and striking in appearance, Andalusians have never taken a very strong hold on public opinion, and at present they are cultivated on a comparatively small scale. The largest number ever seen at a show was in 1888, when at the Crystal Palace there were fifty-eight cocks and cockerels and fifty-five hens and pullets exhibited.

As egg producers, Andalusians compare very favourably with the other Mediterranean races, the hens laying a large white smooth-shelled egg. For table purposes they dress up nice and plump, the flesh when cooked being very white and juicy, and of a delicate flavour. The race is hardy and robust, bearing confinement well, and when allowed full liberty, they are very energetic foragers. The chickens grow fast, the pullets being particularly precocious and laying at an early age. The general characteristics of the cock are that the head should be long and deep, beak rather long, stout, and of a dark horn colour. The comb brilliant red in colour, of moderate size, quite straight and upright, evenly and deeply serrated, firmly set on the head, the back of it following the curve of the neck. Wattles, bright red, long and thin. Lobes white, smooth and pendant, of moderate size. Eyes, large and full, bright orange red, very sparkling. Neck, long, well furnished with hackle feathers. The hackle full and flowing of a sound black. The back slightly round, slanting to the tail, colour deep purple or black, the saddle feathers of the same shade. The wings carried well up, that is, close to the sides of the body, the colour slate blue. Breast prominent, colour slate blue, each feather laced with a much darker tint, or even black : this marginal line being well and sharply defined. Legs of good length, and of a dark leaden hue. Tail full, with nicely arched sickles, colour a deep slate blue. The general appearance is light and active, the body being broad at the shoulders and narrowing towards the tail. The average weights 7 lbs. to 8 lbs., cockerels weighing a little less.

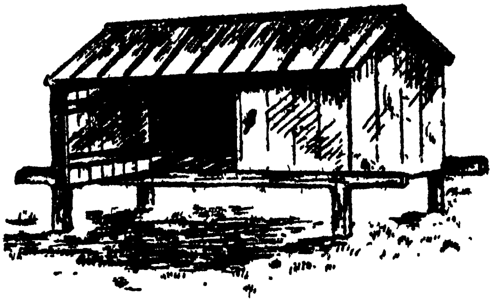
The hen's comb should be bright red, fine in texture, bending gracefully over to one side, well and evenly serrated. Her lobes fairly large, white and smooth, fitting more closely to her head than in the case of the cock. Neck well arched, colour of feathers slate blue, sharply laced round the shoulders, until lost in the small black feathers on the top of the neck and head. Body, colour slate blue, well laced, wings carried close to the body, the lacing showing very prominently on the slate blue ground. Breast carried well forward, the lacing particularly distinct, each feather having a margin of the darker colour. Tail carried well up, and slate blue in colour. The general appearance light and elegant. Average weight 4½ lbs. to 5½ lbs. (*See Plate No.* 5.)

ANIMAL FOOD (*see* "Feeding.")

APOPLEXY (AND SYNCOPE). Apoplexy, or brain paralysis, is one of the only two causes usually accountable for sudden death amongst poultry; the other is syncope, or heart failure. Syncope is likely to be the cause of death in a bird which is over-fat, especially if the fat has got round the heart. Many poultry have hereditary heart trouble, and it is not in the least surprising that here and there one should suddenly drop off. When a bird dies suddenly—or when a bird is taken suddenly ill, and, apparently, is going to die, it is quite easy to determine whether it is a heart attack or a brain attack. If it is a heart attack, the chances are that the bird will die instantly. On the other hand, if apoplexy, which is brought about by the rupture of one of the capillaries or vessels near the brain, and the exudation of a small quantity of blood, which paralyses the nervous system, the bird will not die, but will probably lie for a considerable time in a state of unconsciousness, with its head twisted on one side. It may lie for hours or for days, and in the latter case it probably will gradually recover because, in cases of apoplexy, if the extravasated blood be reabsorbed into the system, the symptoms will disappear, and the bird will gradually recover consciousness. Nothing can be done in any case except keep the patient perfectly quiet. The best "cure" will be to cut the bird's throat and bleed it straight away, unless it be a very valuable stock bird, in which event the letting out of a little blood from the vein under the wing joint may, in cases of apoplexy, relieve the pressure and assist the cure.

ARDENNES (*see* "Foreign breeds, lesser known.")

ARK. This is a type of house for the field accommodation of growing chickens, which is commonly in use throughout the rearing districts of East Sussex, where such large numbers of birds are annually reared and fattened for the London markets; and although in some particulars the Sussex Ark does not, by any means, conform to the theoretical requirements of a chicken house it is found by its eminently practical users to be far more suitable for their purpose than any other. The purpose of its users is to grow chickens to a certain size and condition as quickly as possible, and although it is difficult to say what item of mismanagement is most contributory to failure, it is frequently owing to their methods of housing that rearers in other districts fail to obtain the same rate of growth in the same period. Inexperienced rearers so often neglect their birds when they require most attention, and allow them to continue running on the same ground, and crowding into coops when they have used up their early rearing ground—as regards herbage and its freshness—and are large enough to be housed differently. The Sussex rearer, on the other hand, removes his chickens directly they begin to out-grow their coops and early surroundings, and houses them in what he terms "arks" or "night-hutches," the construction of which would probably be condemned by the theorist as unsuited for the housing of chickens, and too draughty for use by any fowls.



Sussex Ark.

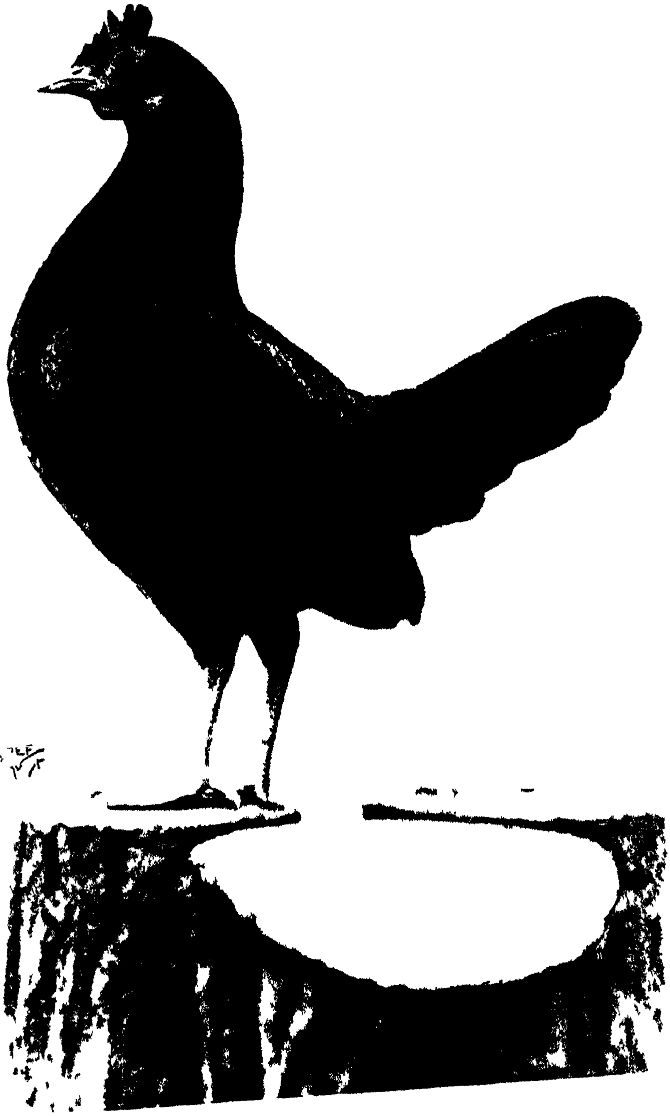
In general appearance the Sussex Ark is very suggestive of the toymaker's conception of the historic vessel of the Deluge, as regards its superstructure, the main point of difference consisting in the fact that it rests upon four short legs, instead of upon a barge-like base. The usual measurements of this type of chicken house are: 5 feet 6 inches long; 2 feet 8 inches wide; and 2 feet 6 inches high. The actual house stands upon legs about 18 inches high, and the two pieces of quartering that form the horizontal portion of the frame at the base of the body are run out about two feet, at either end, to form two pairs of handles, by which two men may easily carry it. About one-third of one side opens upon hinges as a door, and the floor simply consists of a wooden grating, an arrangement by which the land is manured direct, and cleaning is reduced to a minimum The whole is stoutly built, well tarred outside and limewashed within. By the daily and systematic removal of an ark of this description, a field may be very evenly manured, and the chickens will avoid the use of stale ground.

ARTIFICIAL HATCHING (*see* "Incubation.")

ARTIFICIAL REARING (*see* "Rearing, artificial."

ASEEL. This variety of fowl is one among the comparatively few breeds that are by custom associated with a bygone school, and its claim to antiquity is perhaps preferential to that of any of the domesticated races of poultry. But if the Aseel have a strong claim upon the affections of the old-time fancier, they are entitled also to consideration at the hands of the modern poultry-keeper, who cannot fail to recognise in the strong knit frame and characteristic build of the bird, those essentially table properties which have been imparted to its immediate descendant—the Indian Game fowl as we know it to-day. The name "Aseel" has given rise to no inconsiderable amount of discussion among votaries of the breed at various times, but all are agreed that the word, which is Arabic in origin, was employed in the adjectival sense, when bestowed upon this particular race, as signifying something pure, original or high-caste, that being the literal translation of the word *asl*, of which Aseel is a corruption. In general appearance, Aseel bear a strong resemblance to their prototype, the Jungle Fowl, a resemblance which even ages of domestication have failed to obliterate, for it should be remembered that in India the breed has been cultivated, chiefly for fighting purposes, from time immemorial. This inherited propensity makes it necessary for breeders to use care when introducing strange birds into their yards, for unless special precautions are taken, free fights will ensue, often ending in the death of the vanquished. For its size, an Aseel carries more meat than perhaps any other fowl; it is constitutionally hardy, active and vigorous, and consequently suitable as a cross when plump-breasted chickens are required. As layers the hens cannot be said to excel, but they are good sitters and mothers and easily handled. The breed possesses very fair foraging propensities, and will do well on an open run. On the other hand, however, it is by no means impatient of restraint, withstanding confinement without loss of condition, perfectly happy and contented. In this connection it may be mentioned that the Aseel cannot be too frequently handled—that is, if required for show. Judges of the breed attach the greatest importance to body structure and hardness of feather, and make it a desideratum that the bird, whether cock or hen, should remain equally balanced on the palm of the hand, and that it should feel to the touch as though made of wood, wire and whipcord. In stature the Aseel are small by comparison with the Malay and Indian Game; they are short in limb, sturdy and stout in build and decidedly "blocky" throughout. As to colour, there are black-reds, greys, buffs, white, black and red spangled, and others mixed. Black-reds and greys are reputed to be the best fighting birds, but colour is not a serious consideration, provided other points are good. Here are some of the principal points of a typical bird as embodied in the standard drawn up by the late Mr. C. F. Montresor, probably the leading authority on the breed in the early seventies and long after.

PLATE No 7



Old English Partridge Game Bantam Hen.

(Bred and exhibited by Mr Robert Pashley The Keame Lodge Ross)

Winner of 1st Special and Challenge Trophy for best O E G Bantam Crystal Palace 1906 1st Crystal Palace 1907 and 1908 1st and Special best O E Game Bantam Birmingham 1908 etc

Carriage.—This is a most important point, and best exemplified by the bird, when standing upright, having its eye perpendicular to its toe nails, and its sickles, in the case of cocks, about an inch from the ground. The back, short broad, and flat, drooping from the shoulders to the root of the tail, which latter should be very thick and muscular. The breast or chest, also broad and flat, receding from the neck hackle, and meeting the prominent part of the thigh. The wings well up and close to the body, and not showing beyond the stern. Eye.—Pearl, white or pink, very prominent, lustrous and clear, and the lid not overhanging and producing a scowl, as in the Malay. Legs and Feet.—May be of any colour, standing evenly apart, the shank perfectly flat and stout; a fine close scale, devoid of all roughness and irregularity; claws small and compact. Plumage.—Scanty, hard and smooth; the neck hackle short, close and wiry, very difficult to break; tail feathers in cocks sound, close and tapering to points, and not profuse. Old birds frequently produce whitish or parti-coloured sickles and flights, but this is no detriment. The breast bone and tops of shoulders devoid of feather, the red skin showing through. Comb, Face, etc.—The comb small, and what is known as "pea-comb," bright red, tough and gristly, not overlapping. Ear-lobes and wattle small and hard, and the face covered with a hard bright red skin of fine texture without wrinkles or puffiness. The comb and wattles should not be dubbed. Head, Beak, Neck and Shoulders.—The head broad between the eyes and deep through horizontally; beak very strong at the base, slightly curved and as hard as ivory. The neck, also curved, not too long, devoid of flesh, thick, strong, and very muscular, standing out of a pair of level, broad shoulders, the butts being well away from the body at that part and slightly raised. Crow of the Cock.—Is a very certain criterion of the bird's origin. The shrill, cheery, short cry in almost a falsetto indicates that a well-bred one is at hand. Hens have the same characteristics, with due allowance for sex, as the cock, but with diminutive pea-combs.

Aseel Cock.

ASIATIC BREEDS. It is generally admitted by those who have carefully studied the question that the domestic fowl originated in southern Asia, and that all our present-day varieties—numbering some hundreds—are descended from the same parent stock. For many centuries past poultry have been regarded as an important industry in this vast continent, particularly in the eastern and southern sections, and we are indebted for many of our present-day breeds to the care and attention that have been bestowed on the selection and breeding of stock birds by the poultry keepers of southern and eastern Asia. Discussing this point Mr. Edward Brown, in "Races of Domestic Poultry," draws attention to the fact that, as a result of selection and breeding, races of poultry of the Asiatic type are found to possess characteristics of decided individuality. In some directions, more especially in China and Japan, peculiar forms have been developed, largely of a diminutive or bantam character, and in what are known as the Japanese and Booted Bantams and the long-tailed Yokohama the abnormal is very strikingly manifest. With these ornamental races it is not our purpose to deal, as they are of small economic value, and are chiefly bred for exhibition. But among the larger races several of the best known have been imported directly from Asia, although considerable modifications have followed their introduction into Europe and America. These breeds have, without exception, been obtained from the countries adjacent to the sea-coast of Asia, or from the islands where Europeans have settled, and possibly, as the central States of the continent are open to foreign trade and travel, we shall learn of other forms or variations of those already known to us. Pioneers in the opening up of any country are seldom interested in the study of animal and plant life, and it is not often that we learn much as to these until traders or others have been settled for some time.

There are two great types of fowls at the present day, the Asiatic and the Mediterranean. These types are quite distinct from one another, possessing very few characteristics in common. Shape of body, general appearance and carriage, as well as economic qualities are entirely different; the two types, in fact, possess scarcely any similar features. For the sake of comparison a very brief description of the Mediterranean is necessary. The body is small, narrowing towards the tail; the back round; the breast not very well developed; the neck well arched; the head small; and the comb large, usually single. The size of bird varies somewhat, but the average weight of an adult cock is 6 to 7½ lbs., that of a hen 4½ to 6 lbs. So far as economic qualities are concerned, the hens are excellent layers, producing large eggs, invariably pure white in colour. They are, however, poor winter layers, the greater portion of their eggs being laid during the spring and summer. The table qualities are by no means good, the flesh quickly becoming tough and stringy. The chickens are extremely precocious, developing very rapidly. As already indicated, the type as well as the economic characteristics of the Asiatic are totally different. In body it is large, with a full, deep breast, carried well in front; the back is broad, but short; while the tail, which is medium in length, rises sharply from the back, being almost as high as the head. The head is small, rather short, well rounded, carrying a small comb. It is heavy in bone, with powerful legs and feet, usually feathered. The general appearance is that of a large-bodied fowl, with a good carriage. The weight varies very greatly in the different breeds, but a fair average, we think, is 10 lbs. for an adult cock, and 8 lbs. for a hen. When we come to the economic characteristics the difference is still more keenly marked. Asiatic fowls are in the first place valuable as winter layers, producing the bulk of their eggs during the colder period of the year, provided, of course, they are hatched at the right time. This is one of the reasons why they have always enjoyed, particularly one or two of the breeds, a good deal of popularity, for everyone is well aware of the importance of securing a full egg basket in the winter, when prices range high. Asiatics have also been employed extensively in the formation of new breeds, and several of our most popular varieties of to-day owe many of their best points to the infusion of Asiatic blood. With one exception all the breeds belonging to this class produce tinted-shelled eggs. Hens of this type are very persistent sitters and reliable and careful mothers, while, being big, they are able to cover a large number of eggs. So far as table properties are concerned they are fairly good, though by no stretch of imagination can they be termed really first-class. For one thing the bone is rather too heavy, besides which the flesh frequently lacks quality. Generally speaking, Asiatics are hardy and are able to withstand unsuitable surroundings, while the chickens grow slowly, but this is usually the case with large-boned and large-bodied birds.

There are seven Asiatic breeds, some of which, however, are very rarely seen now-a-days. The Brahma, Cochin and Langshan are the best known, and still find a certain amount of support, especially the last mentioned. The Malay, Java, Aseel and Black Sumatra are not very frequently seen, though each possesses a certain number of admirers. At one time there were probably more Brahmas and Cochins in the country than all other pure breeds put together, but that day is now passed, and save for fancy purposes they are rarely seen.

Black Sumatra Game Cock (dubbed.)
Bred by Mr F R Eaton, Norwich
Winner of 1st and Cup Crystal Palace

ASTHMA. Asthma is strictly speaking a form of recurrent, spasmodic or chronic bronchitis. That is not a strictly accurate description, perhaps, but it is sufficient for general purposes and it means in effect that repeated attacks of bronchitis lead up to asthma. It is true that many cases of asthma are directly connected with heart trouble; but this is really weakness of the heart brought about by bronchial attacks. This disorganization of the lungs by bronchitis prevents the proper working of the heart, and consequently the latter organ becomes erratic and refuses to give the requisite supply of blood to the lungs. Asthma then may be the result of want of harmony, as it were, between the lungs and the heart. There is no cure for asthma: we should have to substitute new lungs or a new heart for the existing organs; but it can be relieved, and the more speedily relief is given, the less prolonged and less frequent the spasmodic attacks are, the longer the afflicted creature is likely to live. Death usually occurs by what is known as "syncopal asphyxia," which means suffocation resulting from failure of the heart to perform its functions, so that the lungs cease to act. An asthmatical bird should be treated as for bronchitis, but beyond that, give stimulants. A few drops of brandy, whisky, port wine, or a similar stimulant should be given to urge the heart on to do its work. Preventive measures, therefore, are of most importance, backed by prompt treatmeant when an attack comes on. But it is after all, only worth while attempting to do anything provided the bird is a valuable one.

AYLESBURY (*see* "Ducks.")

AYLESBURY DUCKLING INDUSTRY. In comparison with the Sussex Chicken Industry the localized duckling production of the Vale of Aylesbury is of much smaller financial importance, which is in some measure due to the fact that the output is much more seasonably limited;

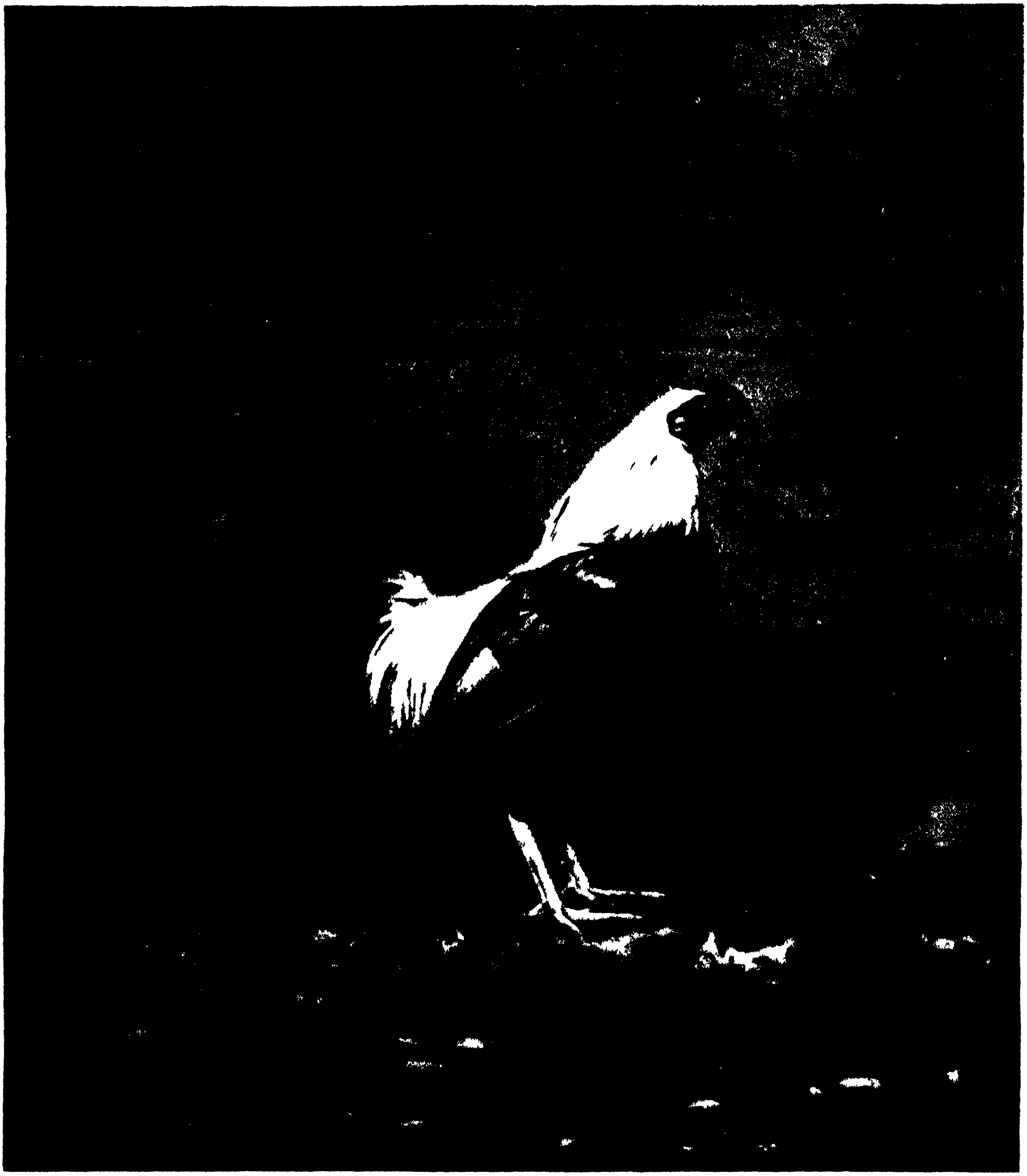
nevertheless, as one of the two specialized poultry productions of Britain, it is of considerable interest owing to the special methods employed, and the success attained. Relative to the latter proposition, it must be noted that, although until quite recent years the breeding of table ducklings was practically confined to the 'duckers' of Buckinghamshire, and their success was in reality that of a monopoly, the modern tendency has been very largely imitative, and nowadays 'Aylesbury Ducklings' are produced in abundance in far distant districts. In addition to this weakening of the old-localized industry, the position has been further assailed from within by the somewhat careless breeding of the stock, and its consequent inclination to degeneracy through in-breeding, but this has been to some extent remedied by the introduction of Pekin blood, and size and stamina have been regained. A further factor has been the growing custom of cold-storing summer ducks for the early market. Nevertheless, despite these inimical influences, the Aylesbury breeders still make reasonably good profits, thanks to their remaining assets of the accumulated knowledge of generations and an old-established reputation.

Showing Arrangement of Duck Enclosure adopted in Aylesbury.

The main characteristics of this industry include the use of a special type of duck, originally exclusively Aylesbury — now crossed to some extent with other blood for the preservation of size and stamina; the very large use of grit in feeding, which was once held to be due to the quality of that found in the locality; the use of the common domestic hen for incubating the duck's eggs, and the very considerable numbers kept for that purpose; the division of labour, by which those who hatch and rear depend primarily upon the stock ducks of others for their supply of eggs; the small areas occupied by large rearers; and the large numbers of cottagers and holders engaged in the industry, together with the facilities for forwarding to market at reduced rates, and such other economic advantages as inevitably grow up with the establishment and growth of a localized industry.

Undoubtedly, the market type of Aylesbury duck (the White English of an earlier classification) is the very best for the purpose of rapid development and early maturity. Ducklings of this breed (see "Ducks,") can be produced weighing from four to five

PLATE No. 8



Old English Duckwing Game Bantam Cockerel.

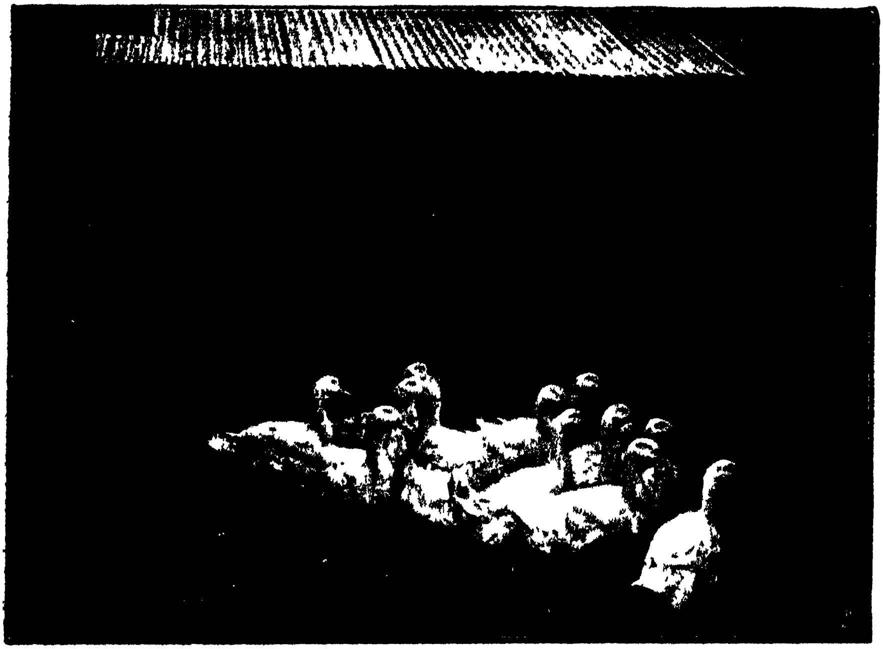
(Bred and exhibited by Mr. J. R. Crompton, Brandlesome House, Bury, Lancs.)

Winner of 2nd Crystal Palace (International) Show, and 1st Birmingham, 1908, only times shown pounds apiece at about eight weeks of age, a result unobtainable with any other description; and although the cross with the Pekin (in the average proportion of about one-quarter Pekin and three-quarters Aylesbury) produces a good layer and a hardy strain, the maintenance of the Aylesbury is preferable.

Those engaged in this special production usually commence hatching in January, and the endeavour is to produce the largest possible number for marketing during March and April, when the highest average returns are experienced; and from that period the prices fall off more or less rapidly, until the output of ducklings becomes dwarfed by the supply of country ducks—these latter being mostly birds of size, and consequently greater age. As already indicated, the bulk of the eggs for hatching are produced by farmers whose stock birds have the advantage of a more considerable range than the generality of the actual 'duckers' can afford them; although as far as possible the rearers endeavour to run their own stock birds and produce at least a proportion of the eggs they set. The price paid for eggs at about the turn of the year often averages as much as about 7/- per dozen, descending by stages to from 1/- to 2/- per dozen in May; but unlike the chicken fatteners, who buy lean birds for their purpose, the 'duckers' prefer to buy their eggs, do their own hatching, and commence their feeding process from the time of hatching. They resemble the chicken rearers, however, in the preference for natural methods of incubation, and although some of their imitators in other districts use artificial appliances, those engaged in the home of the industry are loyal to the hen—in some cases from fifty to one hundred hens are set at the same time. The eggs are set in boxes on the ground, within the shelter of a shed, and the hens are placed in coops every morning for feeding. The method and period of brooding is dominated by the climatic character of the season, and (such as it is) is undertaken by the hens—as many as twenty ducklings being given to a hen; and, as ducklings only require heat for a comparatively short period, a week or ten days is generally sufficient, and in a mild season they are raised in boxes without any heat but that generated by themselves.

Barley meal is the chief article of diet, together with bran, pollard, brewers' grains, rice and greaves. At the commencement the birds are usually given boiled rice, bran and pollard, mixed with the liquor in which meat or greaves have been boiled—the meat itself being added subsequently, when the birds get a little larger, and brewers' grains then take the place of the rice. Grit is given plentifully at all periods, and fresh water is also provided in shallow pans. During the second month the diet consists of greaves, barley meal and grains (or pollard or bran); and some men use only greaves and barley meal, there being some difference in the methods of individuals. In any case, whatever the ingredients and proportions, the above list includes the food stuffs mainly depended upon, and by their use men of experience manage to get a marketable size and condition in their birds at or near the age of eight weeks, which is the standard arrived at by all engaged in the occupation. When weather permits the birds are usually penned on grass during day, and sheltered at night; or they are confined to well-bedded sheds, provided these are capable of thorough ventilation, but, as a rule, access to swimming water is disallowed, and the confinement is more or less strict. As a matter of fact, ducklings can sustain a forcing method which would be impossible with other descriptions of poultry, and the risks from over-crowding and tainted ground are very much less than is the case with chickens. That this is so, is amply proved by the crowding of large numbers on remarkably small areas, which is a marked feature of this industry, and is a constant surprise to those who have dealt with large numbers of chickens—particularly when it is remarked that the same ground is used in the same manner, year after year, without intermission or rest.

As with other poultry produce ducklings are fasted before killing, and are killed by dislocation of the neck. In plucking, only the large feathers are drawn from the wings, but the body is plucked fully; straw and paper are used in packing, and the birds are consigned to the London markets in baskets or hampers. For the average prices realized, see " Poultry Values."



A Pen of Aylesburies on a Buckinghamshire Duck Farm.

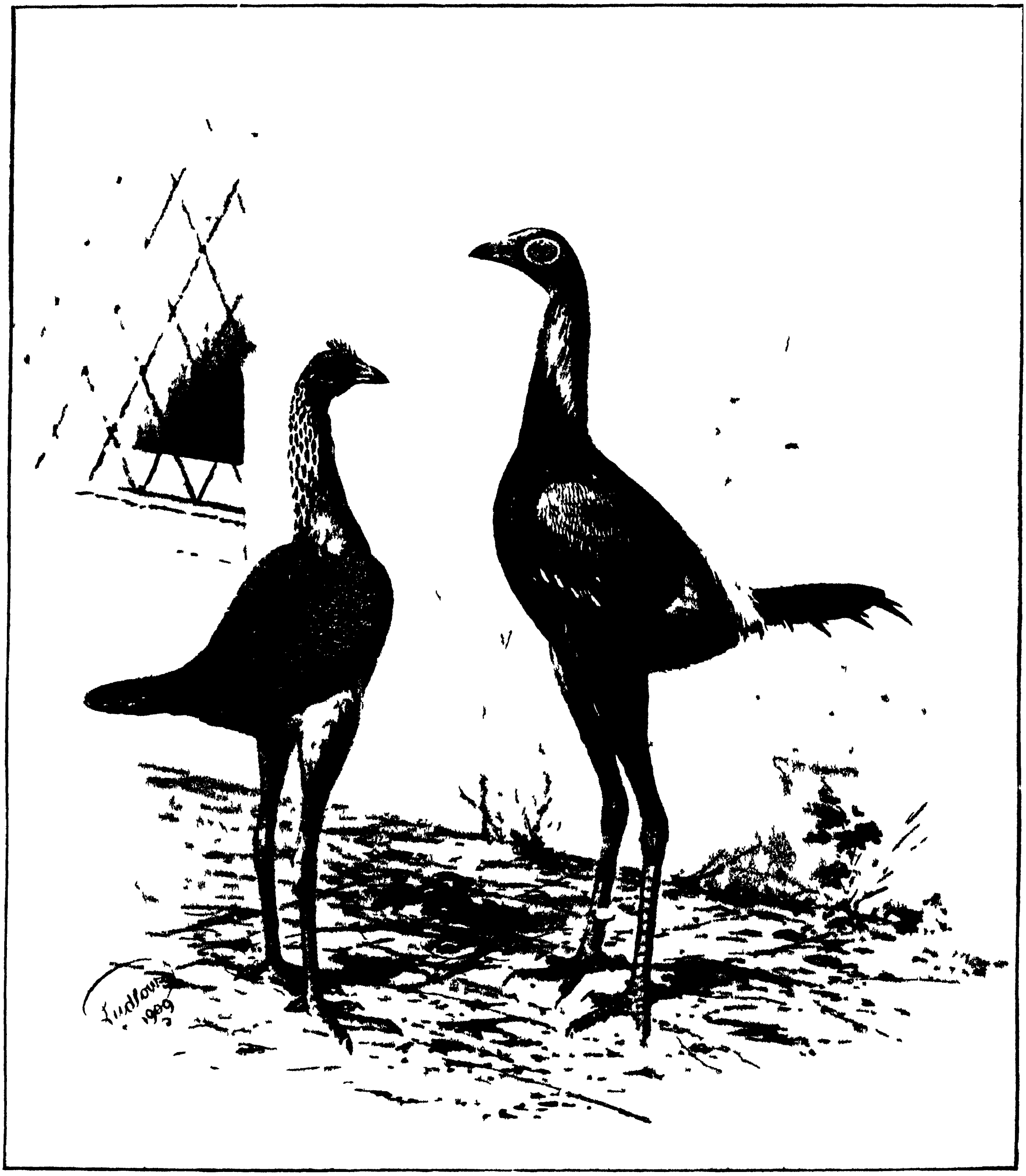
Relative to the methods of those who keep the stock ducks and produce the eggs, it is of interest to note, that in order to procure suitable quantities during December and January, it is the common custom to use young birds for the purpose—allowing them a sufficient grass range and the use of swimming water; but whilst the feeding is generous the dietary is so constituted as to prevent the birds becoming too fat for reproductive purposes. It being the experience of those engaged in the industry that old birds cannot be depended upon to commence laying sufficiently early, it is the general rule to renew the breeding stock every year; mating young drakes with young ducks in the proportion of about one to three or four, and using for the breeding stock birds that have been hatched in the previous March or April.

The above are the main features of the work of duckling breeding and rearing as carried on by those whose success has recently encouraged such a wide-spread attempt at imitation, and it only remains to impress the fact, that in addition to the general suitability of the breed used, and the methods employed, the industry has been built up and its reputation maintained through the close personal attention given to all details in every branch of the production, by those engaged in it. It is this factor of personal experience and constant attention to details that is the main spring of the enterprise; and, it is the lack of such an unknown and indescribable quantity (or quality) that is the undoubted cause of much of the failure elsewhere—nevertheless, the imitators are in many instances sufficiently successful to materially affect the profits of the original industry.

BANTAMS. Almost every person in this country has some knowledge of the Lilliputian breeds of poultry called Bantams, and every poultry fancier is, to a certain extent, familiar with them, while a very large number have kept some of the quaint little birds at some period of their lives. Certainly the Bantam would be greatly missed in this country. A point in favour of Bantams is that they can be kept in gardens, and thrive, too, where it would be impossible to keep any of the large varieties. The interest, care and knowledge to produce "tip-top" show specimens requires the same amount of skill as needed when breeding their larger namesakes. The choice of the different breeds now is so varied that almost every large breed of fancy poultry has its duplicate in miniature form. For instance, suppose one greatly admires the Indian Game or the Cochin, but has not the space at his disposal to keep them, even if he devoted the whole of his garden to the birds, which most of us would not care to do; instead of having to do without them he can keep them in miniature form, for the present type and quality of Indian Game Bantams and Cochin, or Pekin Bantams, are very similar to the large breeds and have to be bred precisely in the same way—the size being the only thing to be considered differently, the Bantam fancier aiming to reduce this instead of trying to increase it. It is generally believed that the original Bantams that arrived in this country came from Java, and were somewhat similar to a small specimen of the Common Jungle fowl, although most of the Bantams that were first generally noticed in this country were of a feather-legged variety and those of the Nankin breed. Up till about thirty odd years ago there were only a few different breeds of the now termed Variety Bantam, the Game Bantam being the most popular and best known. Of late years it has been quite the rage to try to produce a Bantam of almost every variety of fancy poultry and the success obtained by some fanciers is really wonderful, they having produced in almost every way a true and typical fowl of the breed they represent, in Lilliputian form. In nearly all breeds of Bantams the head is rounder and larger in proportion to the body than that of a large fowl, the beak inclined to be short and more curved, breast more prominent and shorter in the back. They have also a different action in walking, possessing a kind of jerky gait which gives them a very jaunty and saucy manner, which is added to by the low carriage of the wings, especially so with the male birds. The flights are generally longer in proportion and the tail usually carried higher than the majority of the larger breeds of poultry.

—— **MODERN AND OLD ENGLISH GAME.** These stand first on the lists of breeds of the Bantam family, and are divided into two sections, *viz*: The Modern Game and the Old English Game. Both have now a very large and enthusiastic number of admirers, and of late years the Old English Game Bantam has considerably increased in popularity. Both kinds make very interesting and attractive birds to keep, and it requires a good deal of careful study and perseverance to produce a really good specimen, so that there is plenty of scope for the fancier to show his abilities in mating, rearing and getting the birds fit for the show pen. The Game Bantam is one of the most showy and stylish of any of the Bantams, good specimens possessing a bright rich colour, hardness of feather—which fits wonderfully close to the body—and a kingly carriage, full of conceit and pride. The chief characteristics of the Modern Game Bantam are—a long and rather narrow head, nicely tapered, eye bright and sharp looking, neck corresponding with the head, long and slight, body short and somewhat wedged shape with prominent shoulders, showing good breadth of chest, wings carried close to the body, tail narrow and whipped shape, legs and thighs long and neat, the toes also long with plenty of space between them, the hind toes being in a line with the front centre toe, which enables the bird to stand very firmly on the ground. It is a serious fault in Game Fowl for the hind toe to turn inwards, usually termed duck-footed, and a bird of this sort is much more easily knocked over when fighting than one with the hind toe correctly placed in a line with the centre front toe. Another important point in breeding Game Bantams is to get the tail in a true line from the body, which must not incline to be carried the least bit either to the right or left, which fault is termed wry-tailed. All the feathers on a Game Fowl should be exceedingly hard and show no sign of fluffiness, rather narrow and curved, thus fitting to the body like an armoured coat. The hackles should also fit close and be narrow, not turning inwards towards the throat and chest as in most of the other varieties. Fineness of bone and graceful carriage, combined with quality throughout, should be one of the principal characteristics of the bird. Avoid birds with coarse and broad rumps—a Game Fowl should be all front, tapering off towards the tail, similar to a wedge, as stated above. A drooping and long-flighted wing often makes a good-shaped body bird look heavy behind and takes away the wedged shape appearance, while a bird that crouches instead of standing erect and smart has the appearance of being short in neck and limb, and may look far worse than a really shorter limbed bird that carries himself well. The black-breasted Reds, or as they are most commonly called the Black Reds, have the first place. The colour of a typical male bird should be: Beak, horn-coloured; face, ear lobes and wattles a bright red, with bright reddish eyes; head and neck hackle, deep golden orange colour; wing bow and back, bright crimson—gradating into a deep golden orange colour on the saddle hackles; wing bar, deep metallic blue; wing butts and shoulders, black; flights, bay colour; tail, black, with a metallic green sheen; neck, breast, thighs and under parts, black, quite free from white or red ticking; legs and feet, willow. The female bird should also have a bright red single comb, face, ear lobes and wattles; eyes, reddish; head, warm gold colour; neck hackle, gold and black, the feathers, having a gold margin with a black centre which should show very sharp and distinctly; back, wings and saddle, an even brown colour, each feather finely pencilled with black and quite free from any reddish or warm tinge of colour, which sometimes appears on the wings near the breast—a common but bad fault; breast, salmon colour, gradating into a grey colour on the thighs and under parts; tail feathers, black, with the exception of the two top, or prominent feathers, which should be pencilled to match the back and saddle; legs and feet, to match the male bird. The brown-breasted Reds, usually termed Brown Reds, rank next in order. The colour of the face, comb, wattles and ear lobes of both sexes in this variety is quite different to that of the other varieties of Game Bantams, except the Birchens, being a dark purple, sometimes termed "Gipsy" faced, their eyes are also of a very deep brown colour, looking almost black; beak, black; head, neck hackle and saddle hackle, light orange or deep lemon colour, the lower feathers of neck hackle having a black centre; back and wing bow, reddish orange colour; wing bars and flights, black, with a metallic green sheen, the latter having less sheen on them so that the wing bars show up prominently; shoulders, black; breast, black, each feather from the throat to the belly having a golden lacing round outer edge; under parts, thighs and tail black, the latter having a green lustre; legs and feet, black. The head of the female should match the male bird;

PLATE No. 9



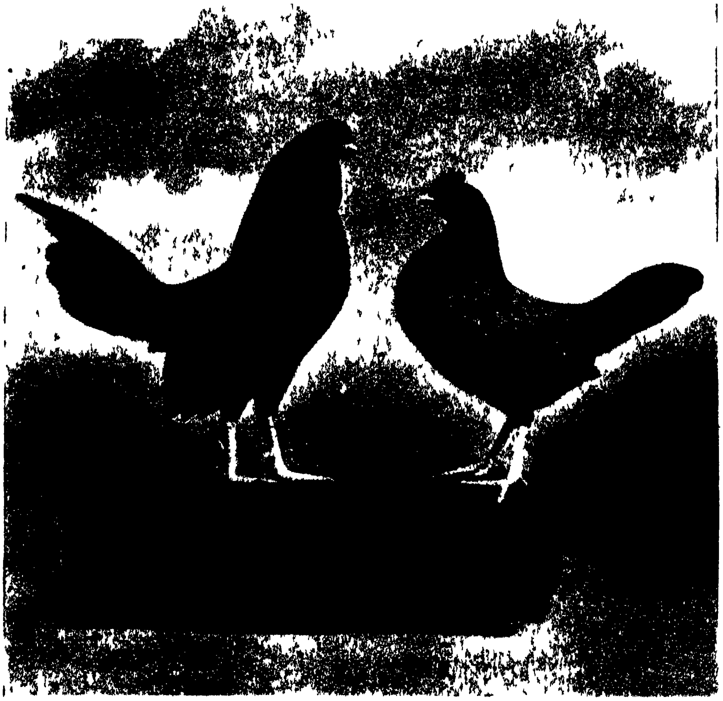
Modern Black Red Game Bantams

(Bred and exhibited by Mr. Hugh [illegible] [illegible] Southport.)
Cockerel—Winner of First and Trophy for Best Game Bantam, Crystal Palace (International), 1908.
Pullet—Winner of First, Crystal Palace (International), 1908.

neck hackle, black feathers, with a gold lacing on outer edge; breast, black, with a neat gold lacing on outer edge of each feather; back, wings, tail and under parts, black, with a green lustre; legs and feet, black. Duckwings are a very pretty variety and are more popular favourites than the Brown Reds, of which there are now only a few breeders. The variety and contrast of colour in a good pair of Duckwings is very taking and claims the admiration of all fanciers. The face, comb (single), wattles and ear lobes of the male bird should be bright red, similar to that of the Black Reds, with reddish eyes; beak, horn colour; head and neck hackle, white, with a creamy, or as it is sometimes termed, pale straw colour tinge; back and wing bow, reddish orange colour, gradating into the saddle hackle, which should be of a similar colour to the neck hackle; breast, shoulders, thighs, under parts and tail, bluish black; wing bars, a lustrous metallic blue, showing up in great contrast to the white flights; legs and feet of a greenish willow. The face, comb, ear lobes, wattles, eyes, beak, legs and feet of the hen to match the cock; head, silvery white; neck hackle, silvery white, with a black lacing in each feather; back and wings, pale grey, finely pencilled with dark grey in the same manner as the Black Red hen, with shafts of a slightly lighter grey colour; breast, pale salmon, with the shaft of each feather of a lighter tint; thighs and under parts, darker grey; tail, black, except the two first feathers, which should correspond with the back and saddle. Piles are a variety which are almost equal in popularity to the Black Reds. These and the Black Reds are far better in reach, fineness of quality and hardness of feather than the other varieties. The colour of both male and female birds, face, comb, ear lobes, wattles and eyes, should be similar to those of the Black Reds. The male bird's head and neck hackle, deep golden orange colour, with rich crimson coloured wing bows and back, the latter gradating into the saddle hackle, which should resemble the neck hackle in colour; breast, shoulders, wing bars, under parts and tail, white, as pure as possible; flights, deep bay, of the same shade of colour as those of the Black Red; beak, legs and feet, good clear yellow. The feathers of the neck hackle of the female bird should have a gold lacing on outer edge, with a narrow white centre; back, wings, tail and under parts, white; throat and breast, salmon colour, fading into the white under parts; beak, legs and feet, bright yellow. Birchens: These resemble the Brown Reds in every way, with the exception that the coloured markings on the feathers of the Brown Reds are of a pure silvery white in the Birchens. The male birds of both Brown Reds and Birchens are coarser and more feathery in neck hackle than the Black Reds, Piles or Duckwings. There are also white and black varieties of Modern Game Bantams, but only very occasionally seen, and have never been popular.

Old English Game are a more modern production, but have made wonderful strides both in the number of breeders and the varieties of the breed, for it is now possible to have in Bantam form any of the varieties of the Old English Game Fowl. In shape they should resemble the large ones, being short and cobby, with powerful chests, shoulders and thighs. A short and hard feathered bird with very quick action is much desired. They are very hardy birds, and keep and thrive where many varieties of Bantams would be a failure. The hens are wonderfully good mothers, and have constant care and attention for their chickens, and will face almost any foe to protect them. This breed is very popular in the North of England, especially in Cumberland, where they almost have the entire monopoly of the Bantam fanciers. The points to breed for in an Old English Game Bantam are.

Head, shorter and broader than the Modern Game Bantam and of a medium length; comb (single), face, wattles and ear lobes, a bright healthy red; eye, red, bright and a sharp expression; beak, medium length and curved; neck, strong and medium length, with a full hackle coming down on to the breast and over top of shoulders and back; the chest and shoulders should be prominent, showing plenty of muscle, indicating strength; back, short and broad; tail, of fair breadth, with good flowing, nicely curved sickles, which should also be fairly broad and quite different from the Modern Game, as a whip tail on an Old English Game Bantam is a very serious fault and absolutely spoils the appearance of the bird; thighs should also be prominent, but short and hard legs, medium length and round in front; feet, medium size, with the hind toe in a true line with the front centre toe; the legs should be set well apart and feet placed very firmly on the ground. Of the different varieties, the Spangles claim first place as chief favourites. In colour the most popular are those which resemble the Black Reds, with the addition of a white patch or spangle at the end of each feather. Purely white flights and tail feathers are very common, especially in the male birds, but are much against their appearance. The aim of the breeder should be to produce birds with every feather properly spangled, thus giving an evenness of colour throughout the bird. White beak, legs and feet are most valued. There is also a black variety, spangled with white, but not popular. The Black Reds come next in popularity, and as regards the colour of plumage the male bird should resemble the Black Red Modern Game, but it is very desirable to have them with white beak, legs and feet. There are two kinds of hens shown as mates for the Black Red cock, *viz.*, the Partridge and the Wheatens. The former should be similar in colour to the modern Black Red Game hen, with the exception of the beak, legs and feet, which should be white. The wheaten hens should have a bright red face, comb, wattles and ear lobes; red eyes; beak, white; head and neck hackle, a golden brown, quite free from any black feathers; breast, thighs and under parts, a creamy white; wings



Old English Blue Red Game Bantam Cock and Old English Wheaten Game Bantam Hen.

The property of Mr H Whitley, Primley Hill, Paignton

Cock—Winner of 1st and Special Exeter, 1st and Special Paignton, 1st and Special Tredegar, etc

Hen—Winner of 1st Lostwithiel, 1st Paignton, 1st Tredegar, only times shown and back, fawn colour; tail, black, except the two top feathers, which are grizzled with brown; legs and feet, white. The Wheaten hens are far more popular and generally of better type than the Partridge hens, and are greater favourites with both judges and exhibitors, although a really good Partridge hen is more difficult to produce. The other varieties of Old English Game Bantams are: Duckwings, Piles, Blue Reds, Blues, Blacks and Whites. The Blue Reds are marked similar to the Black Reds, with the exception that the black plumage is replaced with blue feathers. (*See Plates Nos.* 6 to 13.)

—— **VARIETY BANTAMS.** This is the term used to describe all the breeds of Bantams other than the Modern and Old English Game Bantams.

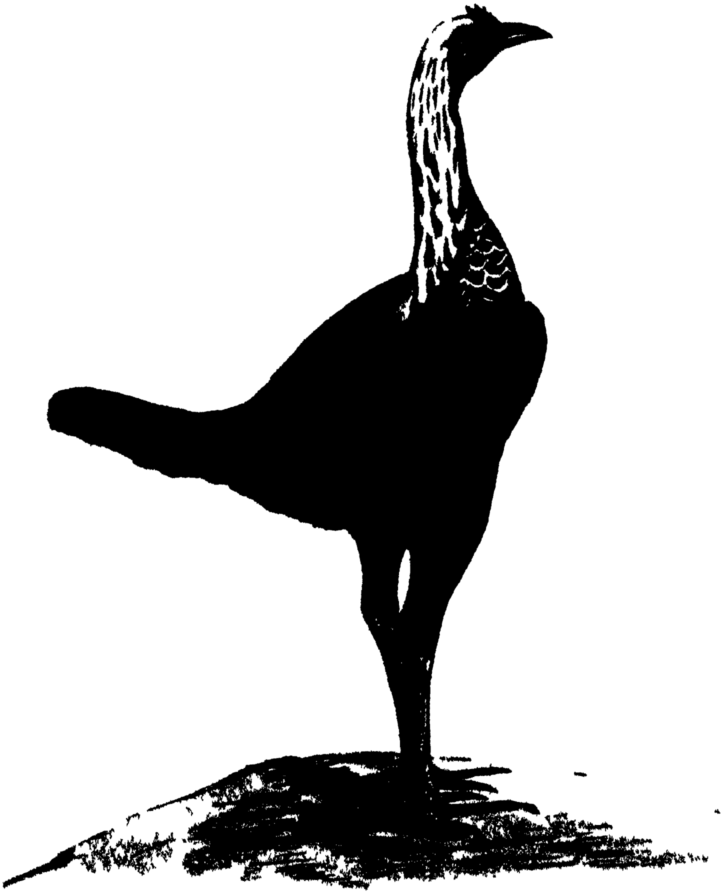
—— **ANDALUSIAN.** These are only in a very few hands and do not seem to make much headway. As a rule, the male birds are of better type than the females. One of the chief difficulties with the females is to breed one with a drooping or hanging comb. Good specimens would look very pretty and attractive, but would need a lot of hard work and patience to produce. The male bird should have a rather long but neat head; medium size single comb, upright and evenly serrated; beak, medium length, horn colour; comb, face and wattles, bright red; ear lobes, white, of fine texture and of an almond shape; neck, longer and not so full as a Black Rosecomb; breast prominent, wings fitting close to the body and carried well up and not covering thighs, thighs, legs and feet, fairly long. The bird should have a smart and graceful carriage. In colour the plumage of the cock should be a good sound lustrous black, on neck hackle, back and saddle; shoulders, wing bow, breast, thighs and wing bars, clear blue-grey, every feather being laced on the outer edge with black; sickles and tail, black; legs and feet, dark slate colour. The female should resemble in head points, but smaller, with the exception of the comb, which should be large and hanging over side of head. The colour of the plumage on the hen's head and neck should be black near head, the feathers gradually becoming a blue colour in the centre as they near the body; remainder of plumage, blue-grey ground colour, every feather having a black lacing on outer edge; legs and feet, dark slate colour. The hen should be fairly long on leg, with smart shape and carriage.

—— **BOOTED.** A quaint variety, but not a very great favourite amongst Bantam fanciers. A few years ago they appeared to make quite a fresh start, but have now sunk down to a small number again. The chief varieties are: Whites, Blacks, Whiskered (of both White and Black varieties), and occasionally one sees a Mottled or Spangled. The Whites have always had the largest number of followers, although the Blacks are quite as good and far less trouble to keep for exhibition. No doubt the reason why they are not more popular is that the chickens are rather delicate, the fertility of the eggs below the average, and having long foot feather they need extra attention and covered runs, with nicely sifted peat moss on the ground, to keep the foot feather from being broken. If the hens are used for sitting it is advisable to cut off a good deal of their foot feather, or else broken eggs and eggs turned out of the nest will be the result. One point in their favour is that exhibition specimens of both sexes can be bred from one pen. All varieties of Booted Bantams should have single combs of medium size, evenly serrated; face, red, with a fair amount of very small white feathers on it; wattles, medium size and rather round in shape in the male birds, whilst the hens are small in comparison and oblong in shape; ear lobes should be bright red, without any sign of white, which is a common fault in this variety; neck, fairly long, with a nice flowing hackle; back short, tail well furnished with side hangers and sickles and carried fairly high; wings, long and carried low; thighs, legs and feet, heavily feathered; breast, full, but not cobby as in a Pekin Bantam; the beak, legs and feet of the white variety should be white. About 20 years ago several good feathered birds had yellow legs and feet and some were shown with bluish-grey legs. The eye should be large and bright. This shows more so in the Black variety, which should also have black or horn coloured beak, with black legs and feet. The Whiskered, or as they are sometimes called the Muffed, are very attractive. The only point in which they differ from the other varieties is that the feathers on the lower part of the face are long, and they are greatly increased in number, giving the bird the appearance of having whiskers—hence the name. The Spangled birds should be of the same shape as the Blacks and the Whites. There are two kinds of Spangles: Blacks with white spangles, and coloured birds with white spangles, something like a Speckled Sussex Fowl in colour. But neither of these varieties have been bred a great deal, although the specimens exhibited were of good type.

—— **BRAHMA.** These are of far more modern production than the Cochin or Pekin Bantams. There are two varieties: the Darks and the Lights, of which the latter are by a long way the most popular and the nearest in type to the large Brahmas, especially the female birds, which are exceedingly good, many of the best specimens being as typical in shape of body and colour and markings of hackles and tails as their big representatives, and at the same time are neat little birds and true Bantams. One of the chief difficulties in breeding Brahma Bantams is to get them small and keep breeding them from the small ones without losing type; the cocks especially are very difficult to produce in this respect. It seems almost impossible to get good type in a really small male bird, all the good type ones yet exhibited have been on the large side. Truly, there has been a few very stylish and nice typical cocks of the Light variety, but these have been quite a third larger than they should be. Both varieties should have neat pea combs, bright red faces, wattles and ear lobes, and in shape they should be somewhat similar to the Pekin, but a trifle longer in leg and not so short in neck or tail, and not so round in breast. The colour of the Dark cock should be: head and neck hackle, pure silver, the hackle feathers having a black stripe down the centre, showing a sharp clear silver edging on each feather—these feathers should flow well over the shoulders and back and come well round in front of the breast; the breast, thighs, under parts, leg and foot feathering and tail, a deep sound black (a bad fault is to have any white tips on the breast feathers); wing bow, outer side of flight feathers, back and shoulders, silvery white; saddle hackle to match the neck hackle; wing bar, black, with a brilliant green sheen, the two first (or top) sickle feathers should have a silver lacing on the outer edge; legs and feet, bright deep yellow; beak, yellow or horn coloured.

The Dark Brahma Bantam hen's head should be silvery white; neck hackle feathers, silver edged, with a black stripe in centre. The remainder of the plumage should be of a bluish-grey in ground colour, every feather finely and very distinctly pencilled with black, even to the fluff and leg and foot feathering, with the exception of the tail feathers, which are black; beak, yellow or horn-coloured; legs and feet, deep yellow. The Light Brahmas in both sexes should have white hackles, each feather sharply striped with black in the centre and to show very distinctly; black tails, and a little black on the foot feathering; the rest of the plumage should be a dead snowy white, absolutely free from any yellow or straw-colour tint; the inside

PLATE No. 10



Modern Birchen Game Bantam Pullet.

(The property of Mr. R. S. Parker, [illegible], Wymondham, Norfolk.)

Winner of 1st Lowestoft.

webbing of flights black, but this should only be seen when the wing is opened.

—— **COCHIN OR PEKIN.** This is one of the oldest varieties of Bantams, but one that has been greatly altered and improved in shape and feathering. For many years there was only the one colour, a kind of yellowish buff, very broken and uneven in colour, some of the male birds having very reddish feathers on shoulders and wings, with black feathers in their tails and flights. They are originally a Chinese production and derive their name of Pekin from the Chinese city of that name, from where they were brought to this country in the year 1860. They used also to be called Cochin China Bantams, because of their resemblance to the Buff Shanghaes or Buff Cochin Chinas of that period. These Bantams were only slightly feathered on the legs (as also were the large Buff Cochins at that time).

Now we have five varieties, *viz.*: The Buffs, Whites, Blacks, Partridge and Cuckoos. The Buffs are and always have been the most popular. All the varieties of Pekins are tame and quiet birds, can be easily kept in a garden without the fear of them getting away, as they do not fly like the clean-legged varieties, neither do they scratch up the mould or damage the flower beds in the way a clean-legged Bantam would do—this with some folks would be a great point in their favour. They lay a nice sized egg, generally with a tinted shell, make good "broodies," and take great care of their chickens, and for this reason they are often crossed with Silkies, the hens from this cross being great favourites with gamekeepers and others for rearing pheasants. As a rule, they go "broody" sooner than other Bantams and do not often lay more than a dozen eggs at a batch. During the breeding season it is advisable to cut off the majority of the foot feathering, as also advised with Booted Bantams, thereby increasing the fertility of the eggs, and helping to keep the hens from breaking the eggs during incubation. In breeding Buffs the correct procedure is to mate a rich coloured cock, but one without any reddish tinge to the feathers, to hens of a light shade of buff; both sexes should, however, be of a good, sound, even colour all over, and not patchy or laced or of a mealy-white colour. These will produce the best kind of chickens. Birds with white feathers should be discarded altogether. Typical Buff Cochin Bantams should be of an even-coloured buff throughout,

Dark Brahma Bantams.

Bred and exhibited by Mr. Thos H. Bowen, The Park, Woburn, Beds

Cock—1st and Challenge Cup, Crystal Palace, and 2nd Birmingham, 1908.
Hen—3rd Crystal Palace, 3rd Birmingham, 1st Canterbury, and 1st Wilmslow, 1908.

with buff under colour, or in other words, every feather should be an even buff right down to the root.

The Blacks and the Whites come next to the Buffs in popularity. The Blacks should be of a deep intense colour, every feather being black to the root (white in under colour is a serious fault which sometimes appears in the neck hackle and tail of the male birds). A good white should be of a pure snowy colour quite free from any creamy or yellow tinge—this fault more often occurs in the males than in the females. The Partridge variety is a very showy one and greatly admired. They should resemble the large Partridge Cochins in colour : The cock's head and neck hackle, deep reddish orange, with a black stripe down the centre of each hackle feather ; wing bow, shoulders and back, deep rich red ; wing bar, black, with a green sheen ; flights on outside web, a deep bay colour ; saddle hackle same as neck hackle ; breast, under parts and tail, deep black, with a green sheen ; thighs and foot feathering, black. The neck hackle of the hen should be of a rich golden colour, with a black stripe down the centre of the feather ; remainder of plumage, lightish brown of an even shade, every feather being finely and distinctly pencilled with dark brown. The correct plumage of the Cuckoos should be similar in both sexes, every feather being of a light bluish-grey colour evenly barred with black, the alternate barring of light grey and black to be of equal width. All varieties of Pekins should have neat, evenly serrated single combs, small red ear lobes and wattles, yellow beak, legs and feet. The Partridge variety, however, more often has horn-coloured beak, and not such a clear yellow on legs and feet as the other varieties. In shape they should resemble the big Cochins, being broad and cobby, and their general outline should consist of a series of curves, short in back and legs, with good full breasts and cushions with a large quantity of foot feathering—the more the better. The feathers of all Pekins should be soft and fluffy and loose from the body, the opposite to a Game Fowl, whose feathers fit quite close to the body and are very hard.

Black and White Pekin Bantams.

The property of Mr H Whitley, Primley Hill, Paignton

Pullet—Winner of 1st Bingley, 1st and Special Paignton, 1st King's Heath, etc.
Cockerel—Unshown

—— **FRIZZLE.** Certainly a very quaint variety and quite one of the curiosities.

of the poultry fancy. Their chief characteristic is to have every feather curled towards the head, the closer and more curled the feathers are the more valuable the birds are as exhibition specimens. Their feathers thus curl the very opposite way to the feathers of other fowls, which follow the shape of the bird. One often hears the remark at shows, where these birds are being exhibited, that they have the appearance of having been dragged through a hedge backwards. However, they are considered a pretty variety by some fanciers, but, of course, tastes differ, and we think it must be an acquired taste to admire a Frizzle Fowl. Both these and the large Frizzle Fowls have been in this country for some time now. It is generally supposed that they originally came from Japan, a supposition that is most likely true, as the majority of quaint and unusual varieties of birds have hailed from that country. As a rule, they are a delicate variety and need extra care, being susceptible to cold, the young chickens especially so, which look rather miserable objects unless they are favoured with bright, warm weather. For this reason it is very advisable not to start breeding until the latter end of April, especially in exposed parts of the country. There are several varieties of Frizzles, but the most common are the Whites, and the Blacks come next on the list. Besides these two varieties there are Blues, Buffs and some coloured similar to Black Red Game. They should have small, neat, evenly serrated, single combs, with small wattles and ear lobes of a bright red colour, the latter free from white. There are also a few specimens seen now and then with rosecombs, but the single comb is the most popular and most desired in this variety. The Whites should be of a pure colour and free from any yellow tint, the same as desired in the white varieties of o her breeds. Beak, legs and feet, bright yellow. Blacks should be sound in colour and free from any white, red or other colour feathers and have black beak, legs and feet. Blues vary in the depth of colour, but the more even they are the better, and their beaks, legs and feet should be a slaty blue. The Frizzle Bantam should be a small and sprightly bird, with prominent breast, arched neck and rather short in back, with the tail carried fairly high, but, of course, the most valued point, from an exhibition point of view, is the amount and quality of the curl in the feathers. This is sometimes assisted by the use of a pair of lady's curling tongs, but if done, and then sent on a long journey to a show in damp weather, the birds will look, by the time they are to be judged, worse than if they had not received artificial assistance.

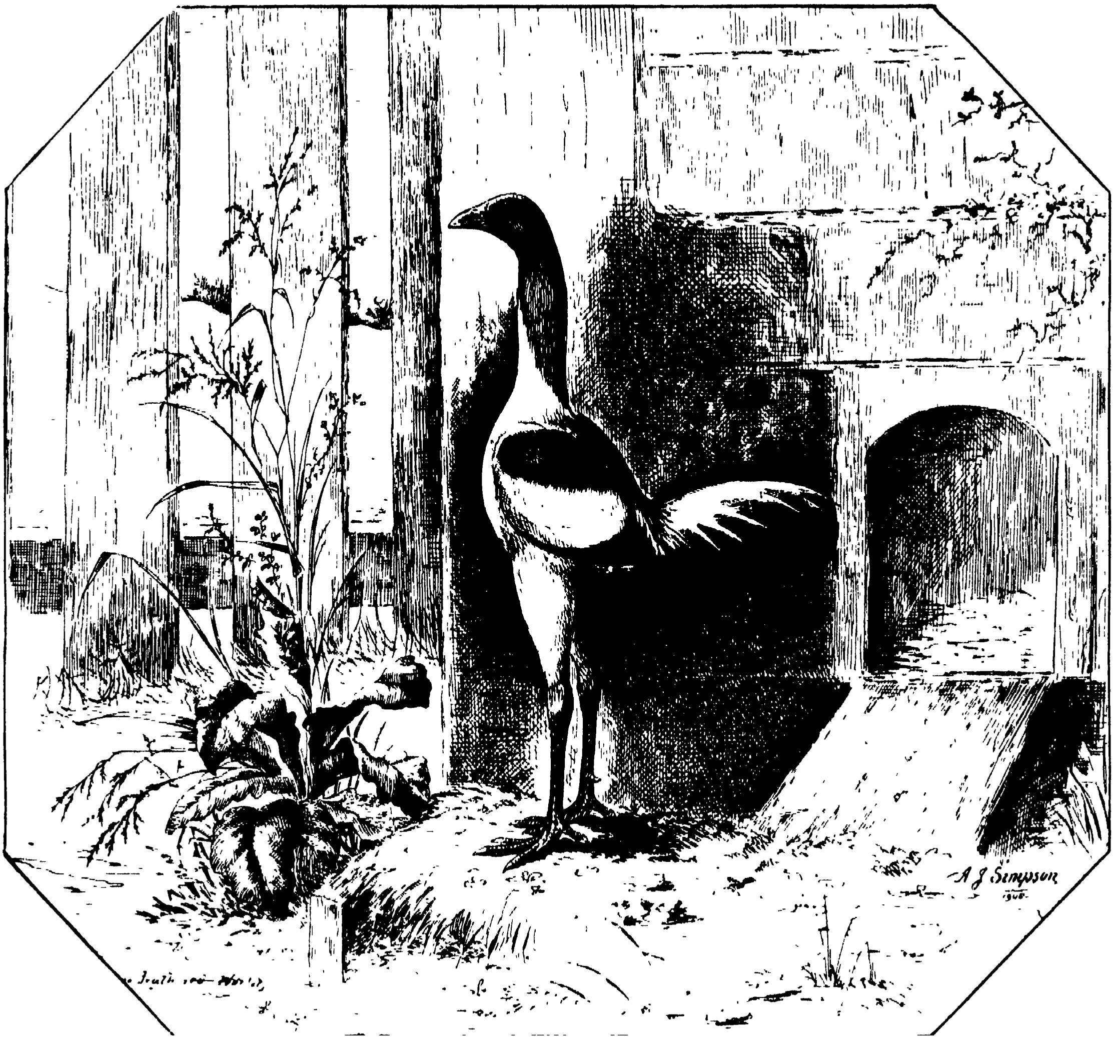
—— **HAMBURGH.** This breed of Bantams has been taken up by only a very few breeders (if we except the Black and White Rosecombs, which are really miniature Hamburghs), and the Silver Spangled Hamburgh Bantam is the only variety that has been bred anything like the type of the large Hamburghs of the same variety. Although few in numbers there have been some really very good specimens exhibited of the Silver Spangled in the any other variety classes at our principal shows. It is surprising they have not had more support, for they are very charming little birds, with a very pretty combination of black and white plumage. With perseverance they should breed as good to type as any variety of Bantam. The reduction from the size of the original Hamburgh is nothing like so large as many other varieties, such, for instance, as the Malays, Brahmas or Cochins.

The chief points to breed for in Silver Spangled Hamburgh Bantams are: A neat rosecomb, well worked, with a straight leader, rising at an angle away from the head; neat little wattles, round in shape; ear lobes quite round and standing away from the face, of a pure white colour, very smooth and of a kid-like surface; the comb, face and wattles, of a brilliant red; the spangles to be a deep solid black, having a beetle green sheen, very sharply defined, not broken or ragged at the edges and of a fair size, the white part of the plumage to be of a pure silvery white; every feather in both sexes to be white, with a black spangle at the tip; beak, legs and feet, slaty blue. The cocks should have good, long, flowing sickles, curving well round, with a good solid spangle at the end. The Silver Pencilled Hamburgh Bantam would also be a very charming variety when bred to the correct markings and type of the large ones.

—— **INDIAN GAME.** Without a doubt this is one of the prettiest and most stylish varieties of the Bantam family. The rich colouring of the plumage, with its metallic lustre, combined with hardness and close fitting feathers, gives them a very striking appearance and calls forth praise and admiration from most breeders of Bantams. For this reason they generally secure one of the money prizes when in a variety class, providing, of course, that they are typical specimens. As a rule, they are a hardy variety to keep, lay a fair number of fair-sized eggs, with tinted shells, and those birds bred which are not good enough for the exhibition pen, or are not required for breeding, make first-class table birds and closely resemble a pheasant, when on the table, the flesh being of fine quality and rich flavour. This variety has made great headway as regards size, type and quality, many birds having been bred of both sexes, being typical specimens of Indian Game in miniature, which is, of course, the aim of every breeder to produce such birds. The colour of all the plumage, with the exception of the flight feathers, of an Indian Game Bantam cock should be a solid black, with a very rich metallic beetle green sheen on each feather. These feathers should be black to the root (white under colour and red in neck hackle are very objectionable faults, which sometimes make their appearance). The flight feathers should be a rich chestnut colour on the outer webbing and black on the inner webbing, which makes a nice contrast to the rest of the plumage; beak, legs and feet, a rich bright yellow; eye bright, of a pale yellow colour, with a determined expression; comb, pea shaped, which, with the face, ear lobes and wattles, should be a brilliant red. The cock is usually shown dubbed. The hen should have a small, neat, pea comb, small wattles and ear lobes, all of a bright red colour; the feathers on head and neck hackle, deep black, with a beetle green sheen; the feathers at lower part of hackle to have a chestnut centre, with a solid green lacing on outer edge, but no sign of rustiness must be seen, which absolutely spoils the appearance of a bird. The remainder of the plumage, with the exception of the tail, should be of a rich chestnut ground colour, every feather having a sharp greenish black lacing round the outer edge, with a second lacing following the form of the feather, which is known as double lacing. This second lacing must be of the same colour, but finer and more broken at the edges, and quite distinct from the ground colour. The lacing should extend right down the thighs and on the under parts and fluff. The true tail feathers are black, with the exception of the first two, which are marked with rich chestnut colour. Beak, legs and feet, rich orange yellow. In shape both sexes should be very cobby and thick set, showing good breadth, with prominent chest and shoulders, squareness of wings and short flights, fitting very close to the body. Tail short and square in shape; legs and feet of medium length and strong, with the toes well spread on the ground. They should possess a stately carriage, with a determined action and courageous appearance. Back and tail should slope downwards.

—— **JAPANESE.** The Japanese Bantam

PLATE No. 11



By permission of "Feathered World."

Modern Pile Game Bantam Cockerel.

(*The property of Mr. T. Illingworth Mitchell, Upwood, Bingley, Yorks.*)

Winner of 1st and Special Crystal Palace, 1908.

has now been bred in this country for a good many years, but the number of fanciers and breeders of this variety has never been very large, no doubt owing to it being a rather delicate breed, and the difficulty experienced in rearing the chickens. It is a very quaint little bird and totally different from any other member of the Bantam family. The short tiny legs, long wings and large tails give them quite a unique appearance, to which is added the strange walk, or more correctly speaking, a kind of waddle, that they possess. They do little damage to a garden, but strange to say, they are good flyers, especially the Blacks. There are several varieties as regards colour, but in shape they should all be alike. The comb is single and upright in both sexes, evenly serrated, of medium size (but rather large in the male birds, in proportion to the size of the bird) and of a bright red colour ; ear lobes and wattles small and neat and of the same colour as the comb ; neck hackle full and well furnished ; back rather short ; chest full ; wings long, and carried very low, the flight feathers touching the ground ; tail rather long, for the size of the bird, the cock having very long curved sickles and carried quite upright—many otherwise good birds are "squirrel" tailed, which is wrong. The varieties consist of the black-tailed Whites, Whites, Blacks, Greys, Buffs, Tailless, Mottles and Reds. The black-tailed Whites are, no doubt, the oldest variety and most common. The whole of the plumage, in both sexes, with the exception of the tail should be a pure, clear, snowy white, quite free from any creamy or yellow colour ; tail black, with a beetle green lustre, some of the feathers having a white lacing on the outer edge ; beak, legs and feet of all varieties, bright yellow. The Blacks should be of a deep sound colour throughout, with an abundance of metallic green sheen on the plumage, with soundness of black in the under colour. The Whites should be pure snowy white all over, and free from coloured or stained feathers of any kind. The Greys rather resemble a Duckwing Game Bantam in colour and marking. The neck hackle of the cock should be a silvery white ; breast, wing bars, under parts, thighs and tail, black, and as lustrous as possible. The hens to match should have head and neck hackle pure silvery white, the lower feathers having a black stripe in the centre ; remainder of plumage bluish-grey, each feather being finely pencilled with dark grey. The Buffs usually seen are rather uneven in colour ; they should be an even buff throughout. (*See Plates Nos.* 14, 15, and 20.)

Black and White Spangled Japanese Bantam Hen.

The property of Mr Maurice Darby, Little Ness, Shrewsbury

Winner of 2nd Crystal Palace and 2nd Birmingham 1908

—— **LEGHORN.** The only variety of Leghorn Bantams worthy of the name yet seen has been a few specimens of the Buff Leghorns, but these were a long way from what they should be, and failed in having very small combs, a large drooping comb seems to be a point that is almost impossible to produce on a Bantam.

—— **MALAY.** At the present time the Malay Bantams are a great deal larger than they used to be, and it would be a great improvement if the size was reduced considerably. The type has much improved of late years, but it has been very largely obtained by sacrificing the size, many typical specimens, as regards shape, being now exhibited at our shows. They are a very hardy variety, the chickens strong and not much trouble to rear. The hens lay a good sized tinted egg, some hens laying quite a big number of eggs during the year. There are five varieties, *viz:* The Reds, Spangles, Whites, Blacks and Piles. The Reds have always been by far the most popular. A pen of really good Red Malay Bantams makes a very pleasing picture, with their brilliant colouring, stately style and commanding carriage, which is quite characteristic of the breed.

Tailless Bantams.

The property of Mr F E Rice, Waverley Hotel, Burgh St Peter's, Beccles

Winners of many prizes

In breeding Malay Bantams the most valued points are shape and type, then size and colour, but we should like to see a little more value given to size than at present it receives. The shape of typical Malay Bantams (of all the five varieties): The cock should have a neat strawberry comb, fitting close to the head; small and neat ear lobes and wattles; throat bare of feathers, with the skin rather loose; head broad, with a powerful curved beak; heavy brows, giving the bird a cruel expression, which is one of the chief characteristics; neck long, but thick near the head, and curved; breast and shoulders broad, prominent and muscular; body compact and showing strength; back curved and broad; wings broad and strong, with short flights; tail curved and drooping, with a fair length of sickle feathers, which should be narrow; thighs straight; long and prominent legs and feet, the toes being well spread with the hind toe in a direct line with the centre front toe. The hen should be of similar shape to the cock, with the exception of the tail, which is carried a trifle higher and fairly short and broad. There are two shades of colour in Red Malays, the Bright Reds and the Maroon or Deep Reds. The neck hackle and saddle hackle of the former should be a rich golden red, whilst in the latter they are a deep crimson or maroon colour. The remainder of the plumage is similar in both varieties, *viz:* Breast, shoulders, under parts, wing bars, thighs and tail, a deep black, with a metallic beetle green sheen, which is very lustrous on the wing bar and sickle feathers; back and wing bow, deep crimson; flights, rich bay on outer web of each feather, and black on the inner web; beak, legs and feet, rich orange yellow; eye, pearl or daw coloured and bright; comb, face, wattles and ear lobes, a bright red. The hens to mate with these are either Wheaten or

Cinnamon, the more even in colour they are the better. Head and neck a deep chestnut brown, quite free from black stripes or ticks. The Wheatens have a cream-coloured breast, under parts and thighs; back, wings and tail, fawn colour. The Cinnamons should be an even colour throughout, but a trifle lighter on breast; comb, strawberry and very small, many birds having hardly any combs at all; wattles and ear lobes very small and bright red; beak, legs and feet, rich orange yellow; eye, pearl or daw coloured. White splashes on feathers or under colour, or pure white feathers in Red Malays, are a serious fault.

The Spangles should resemble the Red Malay, with the addition of having a white spangle at the end of each feather. The Whites and the Blacks should be of a sound even colour and free from feathers of any other colour. Both varieties should have yellow beak, legs and feet; eye, pearl or daw colour. The Whites should be pure in colour and free from any creamy or yellow tint. The Piles should be marked in the same way as the Pile Game Bantams and of a similar colour. All Malay Bantams should be extra hard in feather and have the feathers growing very close to the body; the shoulders should stand out from the body and be more pronounced than any other breed.

—— **MINORCA.** These have made very little headway, most of them being more like Rosecomb Bantams, with single combs, although there have been one or two cocks exhibited of far better type than the hens. The same remark applies to the comb of the hens as that mentioned under the heading of Leghorn Bantams. Minorca Bantams should have a more upright carriage, with more length of head, neck, back and legs than the Rosecomb Bantam.

—— **NANKIN.** The Nankins were one of the first varieties of Bantams introduced in this country, but of late years they have been sadly neglected, and it is quite a curiosity to see a specimen in the show pen. In shape they somewhat resemble the Rosecomb Bantams, having full hackles, prominent breasts, fairly short in back, and tail well curved. Most of the present day specimens have rose-combs, although originally both the rose-combs and single combs were bred. The beak, legs and feet of both varieties should be slate blue, of a rather dark tint. The cock is of a warm shade of buff, with red or reddish brown feathers on back and wings, and a black tail. The hen should be buff throughout, with the exception of the tail, which has a considerable amount of black in it. Comb, face, wattles and ear lobes a bright red.

—— **ORPINGTON.** This also is one of the varieties that is in its infancy. The nearest approach yet exhibited have been some Blacks, but these failed in being too narrow and tall, and much needed some of the cobbiness of the Black Pekin Bantam. The Buff Orpington Bantams are farther away from type than the Blacks, so there is plenty of scope for a breeder of Bantams to show his abilities in this line.

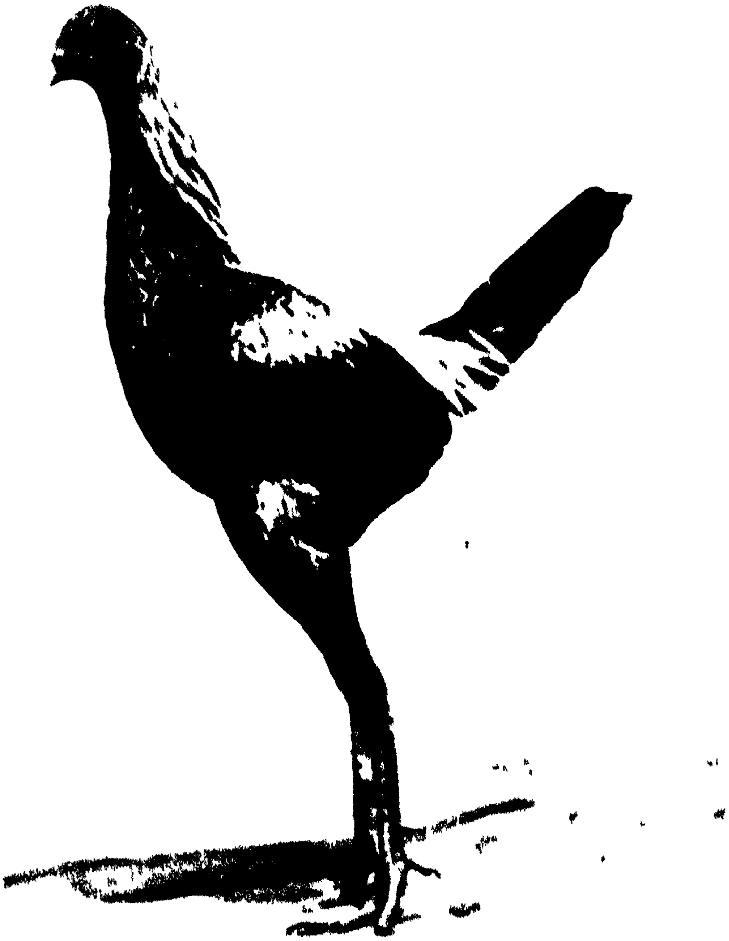
· — **PEKIN.** (*See* Cochin, *page* 39).

—— **PLYMOUTH ROCK.** These should resemble the large Rocks in shape and colour. At present there have been two varieties of Plymouth Rock Bantams exhibited—the Barred and the Buff. Both varieties need a lot of hard work and perseverance to bring them anything like the shape and type of the large Rocks. Many of the Barred Rock Bantams at present are really bad Scotch Grey Bantams, with yellow beaks and legs, and are nothing like the shape of a Plymouth Rock. Some five or six years ago there were two or three very fair shaped cocks exhibited, far better in shape than most of those now met with.

The majority of the specimens now seen are too slight in build and far too long in neck, back, tail and legs for a typical Rock. The plumage of Barred Rock Bantams should be, what is usually termed, cuckoo marked, each feather being barred alternately with greyish white and black of a bluish tinge. The bars should be broader than those on the Scotch Greys. White feathers and white under colour, or brown or brassy feathers are serious faults. Every feather should be barred to the root, the clearer the better. Beak, legs and feet, rich orange yellow. The Buffs should be of an even coloured buff throughout, with sound buff under colour, with rich yellow beak, legs and feet. The comb (single), face, wattles and ear lobes should be bright red in both varieties. (*See Plate No.* 16.)

White Rosecomb Bantams.

—— **POLISH.** Are a very pretty variety, with their little round crests and modest style and carriage. They are very quaint birds and usually get very tame, and make nice pets. It is necessary to keep them very dry, and for this reason they should be confined in a covered run during wet weather, as the crests very soon become wet and get absolutely spoiled. The plumage altogether is very soft, so the rain soaks into them instead of running off, as in the hard feathered varieties. A shower that would soak a Polish Bantam would hardly have any effect on a good, hard Indian Game or Malay Bantam. They also need keeping in fairly sheltered positions, as some of them easily take cold. The chickens also need a little extra care and attention, but at the same time they are a very fascinating and quaint variety for anyone to keep as a hobby. There are six recognised varieties, *viz:* The Whites, White Crested Blacks, Silvers, Golds, Buffs and the Buff Laced. In shape and colour they should be a repetition of the large Polands, in miniature form. The White variety is by far the most popular. As in other white varieties of fowls, they should be of a pure snowy white, of a very neat shape and fine in bone. The crest should be large, but round and very even, without any sign of a break in the centre —this applies to all the varieties. Beak, legs and feet, slaty blue, although one sometimes sees otherwise good birds with white beak, legs and feet, which is wrong. All varieties expect the White Crested Blacks should have whiskers and beards; these should be of an even shape and well filled up, the former being close to the lower part of the crest. The neck should be of medium length, breast full and deep, giving the bird rather a square appearance in body; back and tail also of medium length, the latter partly spread, not fan shaped or whipped. The cocks should have nice flowing sickles, well curved;



Modern Game Birchen Bantam Cock.

(The property of Mr F E M Bottomley, Hollins Close, Bolton Woods, Bradford)

Winner of 1st and Special Haywood's Heath, 1st and Special Bury, Special over all Modern Game Bantams 1st and Special Crystal Palace (International) (twice) 1st Special and Cup Kendal (twice), and 1st and Special Birmingham thighs, legs and feet, fairly short, but not stumpy, as the bird should have a stylish carriage. They should all be fine in bone, all the plumage to be of a fine and soft texture. The White Crested Blacks are, without doubt, one of the most effective varieties of Bantams, but, in spite of this, have not made much advance. The hens of this breed are far better in type than the cocks. The crest should be a pure white, in both sexes, with the exception of two tufts of black feathers in front of the hen's crest. The remainder of the plumage should be a deep black, having a beetle green lustre—the more lustrous the better. Beak, legs and feet, a very dark slaty blue. The Golds and Silvers, as a rule, are larger and not so good in type, the majority of them being far too heavy in the black. Each feather should be evenly laced, with black round the outer edge, including the crest; this lacing should have a clean cut inner edge. The ground colour of the Silvers should be a pure silvery white and that of the Golds an even rich gold colour. Neither variety should have any white feathers, although they generally appear in the crests. Beak, legs and feet, slaty blue. The Buffs should be of an even coloured buff all over, the same tint on body as crest. The Buff Laces should have the ground colour of deep buff of the same shade on all the plumage, and every feather sharply laced with white on the outer edge. Both Buffs and Buff Laces should have slaty blue beaks, legs and feet.

—— **ROSECOMB.** The Rosecombs can justly claim the first place amongst the Variety Bantams, as being one of the oldest breeds and having the largest number of fanciers and breeders on its list. There are two varieties of Rosecombs, the Blacks and the Whites, but the number of fanciers of the Blacks and the number of those who keep the Whites is beyond all comparison. The Blacks have always been, and are likely to be, a very long way the first favourites for many reasons. The Black Rosecomb is one of the ideal birds for those fanciers who have to keep their birds in a city where smoke usually abounds—an enemy to all white plumage birds, as those know who have had the opportunity of seeing white varieties when in, or near, a large town. The colour kept of their plumage then is almost undescribable, and a thorough good bath is absolutely necessary every time one intends to send them to a show. With the Blacks all this labour is saved as regards the plumage. As a rule, the Blacks have a far stronger constitution than the Whites, and are hardy and easily reared when once they have passed the first two or three weeks of their lives. The young chickens are very energetic and work hard for their living, scraping over the mould for a dainty morsel and running about on the look out for any stray grubs or else chasing a fly. They feather well and quickly, especially the pullets. The little chickens that have some pale yellow fluff on them and their small flight feathers tipped with white are usually the best coloured birds when

Black Rosecomb Bantam Cock.

full grown. They lay a good sized egg and quite a large number during the year, sit steadily and are careful mothers. The male birds are very pugnacious and will fight with the pluck and determination of a Game Cock. As regards the points of an ideal Black Rosecomb cock, these vary somewhat in type. The type favoured in Scotland being shorter in back and a trifle higher in tail, whilst Southern fanciers prefer birds possessing a more graceful appearance and nearer that of a good stylish Black Hamburgh. The comb should fit close to the head, be oval in shape, slightly narrower towards the back and tapering into the leader or spike, which should be carried at an angle from the head. The comb must be evenly serrated or worked with a number of little spikes and quite free from any hollowness in front or on the centre. A comb well filled up in front and level on top, gives the bird a very smart appearance, and is very much valued by breeders of this variety. Head rather round in shape and broad; beak curved, short and strong; face bright red, and absolutely free from any white; wattles bright red and round, and fine in quality; ear lobes perfectly round, intensely white and of a very fine soft texture, often compared to white kid; wattles and ear lobes should harmonise in size, and the ear lobes should be thicker and more distinct from the face than in other breeds, of a flat even surface and raised from the face; eye, bright and brown; neck fairly short, with an abundance of good flowing hackle feathers, coming well in front on breast, covering the shoulders and down on to the back; breast full and prominent, with a nice curve; shoulders broad, but hidden by neck hackle; back rather short and broad; wings broad and full and carried rather low; saddle well furnished, with well curved flowing feathers to match the neck hackle; tail full and well furnished, with side hangers and sickle feathers, which should be long, but nicely curved, coming round in the form of a sickle and carried sloping away from the back; legs and feet short and black. A Rosecomb should be a short, broad and cobby bird, but full of life and action. The head of the hen should be somewhat similar to the cock's, but, of course, the comb, wattles and ear lobes should be very much smaller; head, neck and body, short and cobby; wings broad and full, but not long—a common fault in the hens is the length of their flight feathers, which is often far too long, and thus takes away from their cobby appearance and makes them look long and coarse; the tail should be full, but neat, and in proportion to the bird; beak, legs and feet black. The plumage of both sexes should be a deep black, having a beetle green sheen—the more lustrous the better. The White Rosecombs should be of the same shape and type as the Blacks. The shape and quality of the combs and lobes are, as a rule, inferior to those of the Blacks. They are also usually finer in bone, especially the female birds. The plumage of both sexes should be of a pure snowy white and absolutely free from any yellow and straw coloured tinge.

—— **SCOTCH GREY.** There may be more gaudily feathered members of the Bantam family, but for style, pluck, hardiness and cheek, there is not one to beat the little Scotch Grey Bantam. It is a breed that grows on one, for the fancier that once really takes to them has always a love and interest in this little chequered bird. Certainly it needs a big lot of perseverance and determination to breed a really good Scotch Grey, for such don't appear every day. It is a pity they are not better provided for at our shows, and the judging of them is often very disappointing to the breeder. The hens, as a rule, are exceptionally good layers, and lay more eggs in a year than most varieties of Bantams. The eggs are a good size and have big yolks and possess a rich flavour, whilst those birds that are of no use for showing or stock make excellent little table birds, the flesh being white, nice flavour and tender. The hens are first-class "broodies" and make very good mothers, and will fight almost anything to protect their chickens. Scotch Grey Bantams should be a facsimile of the large Scotch Grey Fowl in everything but size. They should be very stylish birds, with a smart carriage, and not squatty, short or cobby like a Rosecomb, which is the shape of some of the birds seen at shows. The head should be of medium length, not round, with a neat, evenly serrated single comb, well set on the head; small and neat wattles and ear lobes, all of a brilliant red colour, the latter being free from any white; beak, legs and feet white, mottled with black; neck, body, thighs and legs of medium length; the tail should be carried at an angle, sloping away from the back, and not upright, the cock's sickles to be nicely curved. The colour of the plumage in both sexes should be of the same shade throughout; the ground colour of a pale steel grey, not white, and every feather barred with an intense steel black straight across the feather and not V shape. The light and dark bars to be of equal breadth and much finer than those required for the Plymouth Rock. The dark bars should have a beetle green lustre and every feather should be distinctly barred to the root, with a dark bar at the tip of the feather, which gives the correct appearance. Some birds have their breast feathers ending with a light bar or a light tip—this is a bad fault and completely spoils the look of the bird. White under colour is also a bad fault, but red or brownish grizzled feathers in a bird should disqualify it for either the show bench or the breeding pen. Black feathers usually make their appearance, and often in the best birds, but these are, by a long way, one of the least serious faults. Smoky coloured birds, or birds with the dark barring of a dirty grey colour, and very broken at the edges, should be discarded altogether. One of the beauties of a Scotch Grey is to have the marking smart and bright.

—— **SEBRIGHT.** A very old but popular variety of the Bantam family, and the majority of poultry fanciers are well aware that these birds owe their name to the originator of the breed, the late Sir John Sebright, Bart., who commenced the making of this variety a hundred years ago, whilst another ardent and enthusiastic breeder, Mr. Hewett, wrote as having been a breeder of them for twenty years in "The Poultry Book," by the Rev. W. Wingfield and G. W. Johnson, published in 1853. There are two varieties, the Golds and the Silvers, both very charming birds to see, and quite unique in build and colour. They are not a very robust breed and the chickens need a fair amount of care and attention; the percentage of fertile eggs is also far below the average. Some say that the reason for this, to a great extent, is that the male birds have tails of the same shape as the female, without any sickles, and advocate that if a male is used for breeding that has the first feathers of his tail a trifle long and pointed, somewhat resembling a half-grown sickle feather, that the number of fertile eggs will be greatly increased. Some twenty odd years ago all Sebrights had "Gipsy" faces, with combs and wattles of a deep purple colour, the ear lobes purple, with a pale blue centre. A bird with a red comb, face and wattles was then a curiosity, but now one never sees a Gipsy faced one, nor has there been one exhibited for many years. It is a great pity that the original colour was not maintained, for it was more striking and gave the bird a better appearance. Another fault in the present day Sebrights is the ugly shape and coarseness of the comb, which is far too deep in the base and stands away from the head. A typical

Sebright should have a neat rosecomb, not too small, but well placed on the head, round neat wattles and small ear lobes, and according to the present day fashion all to be of a bright red and no signs of white in the ear lobe. In shape they should be compact ; neck medium length, well arched ; back rather short ; tail medium length, and carried well up, but not squirrel ; fairly short in thighs and legs. Both varieties should have rather short and broad feathers, every feather laced on the outside edge with deep black, having a green sheen. The remainder of the feather should be absolutely free from any ticking or grizzle markings, usually termed mossiness—this fault occurs mostly in the tail feathers. The lacing must be of an even breadth and strength of black throughout, not varying on the breast, wings or back. The Golds should be of a rich golden brown colour, the same shade all over the plumage of the bird, without any signs of light shafts, and the Silvers must be a pure cold silvery white, free from any yellow or creamy tinge. Beaks, legs and feet of both varieties, slaty blue. (*See Plates Nos.* 17, 18 *and* 20.)

Duckwing Yokohama Bantams.

The property of Mrs L C Prideaux, Lindfield, Hayward's Heath

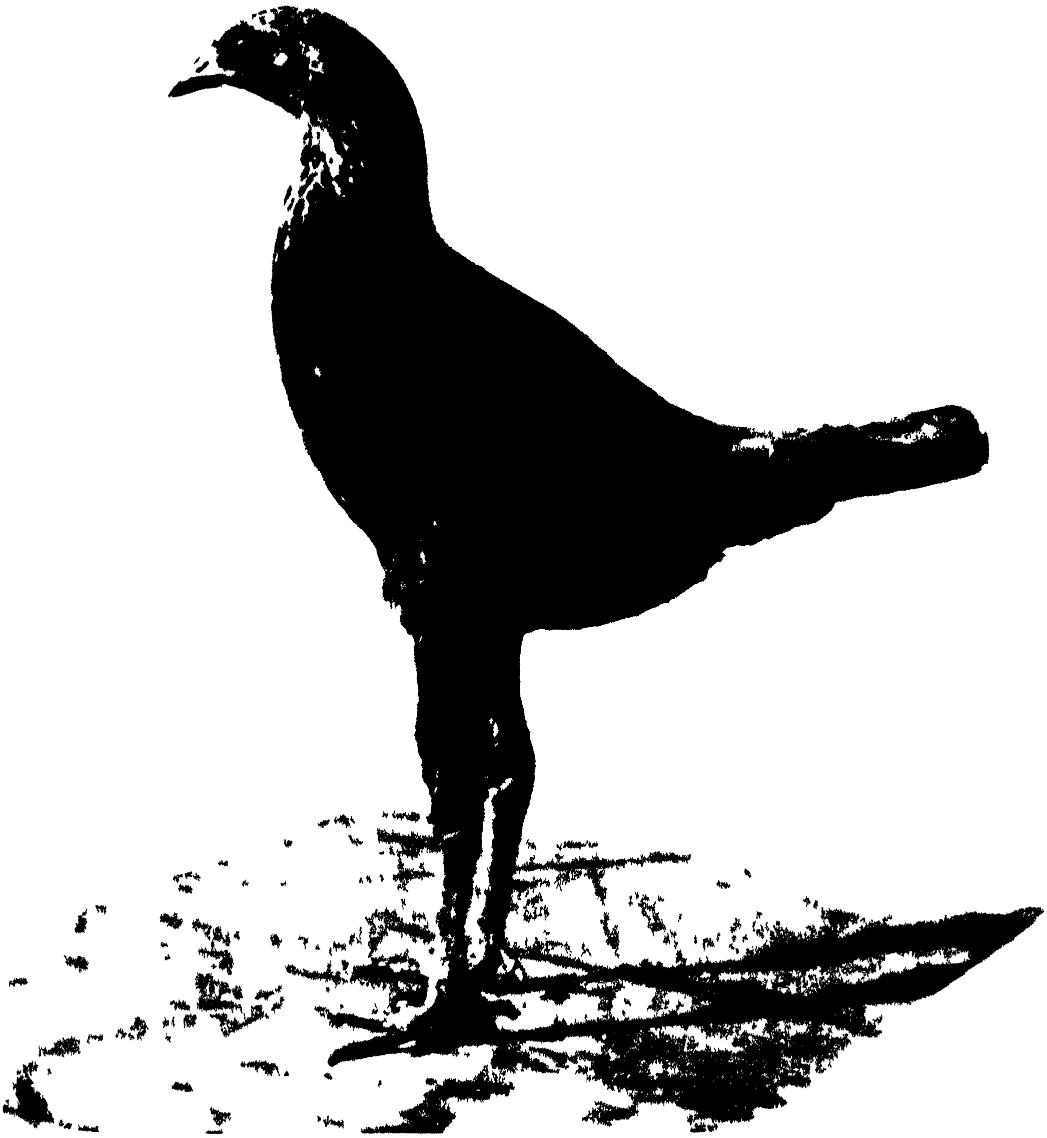
—— **SPANISH.** The Black Spanish Bantam has been now produced of very good type, but it is only in a few hands and seems to make no advance in the number of breeders. It is quite a characteristic breed, but, like its large namesake, is not fashionable at present. These Bantams should be a miniature reproduction of the Black Spanish Fowl. The cock should have a neat, upright, evenly serrated, single comb, of a smooth surface ; white face and ear lobes, which should be in one and show no sign where the face and ear lobe joins- they should be very smooth and of a kid-like surface ; wattles rather long and red ; plumage black, with a brilliant green lustre. The hen should resemble the cock, with the exception that the comb should hang over and cover one side of the face ; beak, black or horn colour ; legs and feet a slaty blue.

—— **WYANDOTTE.** These have made big strides the last few years, the Partridge Wyandotte Bantams being exceptionally good, and no doubt will become one of the popular varieties when more established and better known. (*See Plate No.* 19.)

At present the shape is very fair, and some of the hens are very good in pencilling. There are also a few Black Wyandotte Bantams, but these are a long way behind the Partridge in shape and type generally.

—— **YOKOHAMA.** This is one of the latest additions, but one that will no doubt become popular if brought true to type and the length of feather so much desired in the Yokohamas can be obtained. The best yet produced are of the Duckwing variety, and they

PLATE No. 13



Modern Game Birchen Bantam Hen.

(*The property of Mr F I M Bottomley, Hollins Close, Bolton Woods, Bradford.*)

Winner of 1st and Cup Kendal, 1st and Special Crystal Palace (International) and 1st and Special Birmingham
Only times shown

give great promise of being very charming little birds.

BARBEZIEUX (*see* "French Breeds.")

BARLEY (*see* "Feeding stuffs.")

BARRING (*see* "Feathers.")

BEARD. The tuft of feathers under the throat peculiar to some breeds, as Crevecœurs, Houdans and Polish (*see* "Crested and bearded fowls.")

BIB. Same as Beard.

BLASTODERM. The germ spot in an egg (*see* "Eggs, structure.")

BLINDNESS. Poultry do not often suffer from blindness unless there has been some special cause such as an accident or an attack of roup in the form known as "one-eye cold," which is fully dealt with under another heading (see "Roup"). Occasionally a bird has the appearance of being blind in one eye by reason of a certain fixedness of the pupil —but it is generally found that such is not the case. One sure test of blindness or any sight-defect in a fowl is to observe the way it walks; it will always go in the direction seen by the sound eye. Nothing can be done for blindness, as such; but a good deal can be done to relieve the various forms of soreness of the eyes by which poultry are often affected, and which may lead on to something more serious if not dealt with at once. Thus, apart from the result of roup, and roupy colds, it is possible for a slight injury, such as might be caused by fighting or by a thorn, to set up inflammation in the eye that must cause the bird a great deal of suffering, even if it does not result in permanent injury. To treat such a case some cooling lotion or ointment is generally the best—spermaceti ointment is as good as anything; whilst for running at the eyes, where an astringent lotion would seem to be necessary, a weak solution of sulphate of zinc in water is best—say, about one grain of the chemical to one fluid ounce of water. In all eye troubles there is a tendency for the eyelids to become sealed together; this makes matters worse and should be prevented by the use of a little ointment, the effect of which will be to grease the lids and so to prevent them from sticking together. Each morning and last thing every night carefully bathe the eyes with tepid water or with tepid milk and water, in order to thoroughly cleanse the eyelids from any accumulation.

BLOOD, AS FOOD (*see* "Feeding stuffs.")

BLOOD, IN EGGS (*see* "Eggs, abnormal.")

BLUE. A light slate colour, as seen in Andalusians.

BLUE DUCKS (*see* "Ducks, Blue Orpington.")

BLUE JERSEY (*see* "American breeds.")

BONE, GREEN CUT (*see* "Feeding stuffs.")

BONE MEAL (*see* "Feeding stuffs.")

BONES, FRACTURED (*see* "Accidents.")

BOURBOUNNAIX (*see* "French Breeds.")

BOURBOURG (see "French Breeds.")

BRAHMA. The Brahma is one of the most attractive varieties of the Asiatic race of fowls. Its massive size, coupled with the heavy feathering, call forth comment whenever and wherever it is seen. On the show bench it is admired by all, both for its size and the happy blending of the colours, either in the Darks or the Lights. Since its advent into this country about the year 1850 the fancy points of the bird have greatly improved, although the utility side has been almost ignored. The name, shortened down from Brahma-pootra, indicates the place of origin, but the Indian name was, and is now, the Grey Chittagong. This, as may be gathered, has reference to the Darks, but the Lights are the result of selection in breeding from the lightest of the dark variety, and possibly the infusion of a little other foreign blood. Both colours undoubtedly came to us from America, where they were carefully bred for winter egg production, but in the hands of the English fancier the bird has been altered in many ways. The sparse leg feathering and short foot feather have given place to heavy fluff, leg and footings, with a fuller breast, neck, and saddle as a natural result. In the eye of the fancier it has been a great improvement, for it has added massiveness to the bird, a more majestic appearance, consequently made them more clumsy in getting about. This leads up to a quiet disposition, which helps to retain their popularity.

Light Brahma.

Although we have only the two colours, the writer saw a cockerel and two pullets all of pure white, at the late Mr. R. Holland's place, about the year 1892; these had been bred from the Lights. They possessed all the characteristics of the breed, and would have formed the foundation for a new colour, though whether it would have been welcomed is open to doubt. Although they have such a massive appearance, the head is small and neat, and crowned with a pea comb, while the wattles should be small in proportion to the other parts. The general character of each colour is the same, but the bird as a whole is more upright than the Cochin, and should be rather jaunty in carriage. The primary failings in Brahmas are the vulture hock and lack of foot feather. The meaning of the hock is that the feathers stand out hard and stiff like the vulture, and then a break in the leg feathering is usually seen. The fault is noticed more in the Darks than the Lights, and all the small bodied birds show it most. In general effect the leg must be yellow, as is also the skin and the beak. To take the colour of the Darks, first it is essential that for an exhibition cock, the breast, fluff, under feathers and feet should all be black, with little or no lacing, as seen in all pullet breeding cockerels; the shoulders and wing bows must be a clear silvery white, while the saddle should be clear in the same manner, heading off into the saddle hackle, which, like the neck hackle, must have a black stripe running down the centre of each feather. The primary feathers of the wing must be black with a rich green shading, and the tail of a like nature. *A pullet-breeding cockerel will not be quite so clear in the neck and saddle striping, and will show much ticking down the breast, fluff and thigh, and most likely some white in the foot feather. The hens should show a beautifully clear pencilling all through, and as even as possible. In colour there have been two shades, one a silvery nature, while the other has looked more of a steel grey all through. The feather has a silvery white pencilling on a very dark ground colour, the primary feature being clearness of marking, evenness throughout and absence of any brown colouring, which is so prevalent upon old hens. The most difficult parts to get like this are the fluff, cushion, lower breast and feet. Even in the neck hackle there can be found the pencilling, and on the well-bred hens the marking runs right down to the skin. The cock-breeding hens must be very broad in body, free from any pencilling on the body, generally darker in colour, and have a clear stripe running down the neck hackle, as in the exhibition cock. The back must be short in every case, and not show too great a cushion, excess of which gives them too much of a Cochin appearance. The Light is far ahead in colour and beauty when kept on a grass run, and though not easy, is not difficult to breed. Although a few of the fanciers breed the two sexes from different pens, good birds can be produced from one. The real difficulty in the Lights is keeping a pure white body colour and preserving the footings, absence of which throws a bird out of the running at once. In the cocks the neck and saddle hackle should be striped with black, while the tail and tail coverts must be black, although a little white on the tail or sickles is not a serious fault, other points being good. The inside part of the wing feather will be black and it may show a little edging on the outside, but very small. On the feet the longest feathers will be black and white, but the top of the feet must be white, as is also the fluff, under feather and breast. With the exception of the saddle hackle in the hens, the females must have the same colouring at the same points. Many grand hens have been shown lately, but the tendency is towards too much Cochin character. It is a breed that wants keeping to thoroughly appreciate its beauty, and then the fascination grows. (*See Plates Nos.* 21 *and* 22.)

BREDA (*see* "Foreign breeds, lesser known.")

BREED. A variety, or merely a race, of domestic fowls possessing particular qualities, but not differing from the ordinary species sufficiently to constitute what naturalists would strictly speaking term a variety.

BREEDING. There is probably no question relating to poultry of more importance than that of the laws of breeding, and yet there is no question over which there is so much ignorance. Many poultry-keepers, men of wide practical experience, seem to devote but little thought or attention to this very important matter, apparently under the impression that feeding, housing, etc., are of greater moment than a knowledge of the laws governing the reproduction of the species. That such is a mistaken idea, however, there are many who are ready to testify, as these realize fully the great importance of paying the strictest attention to the selection and mating of the breeding stock.

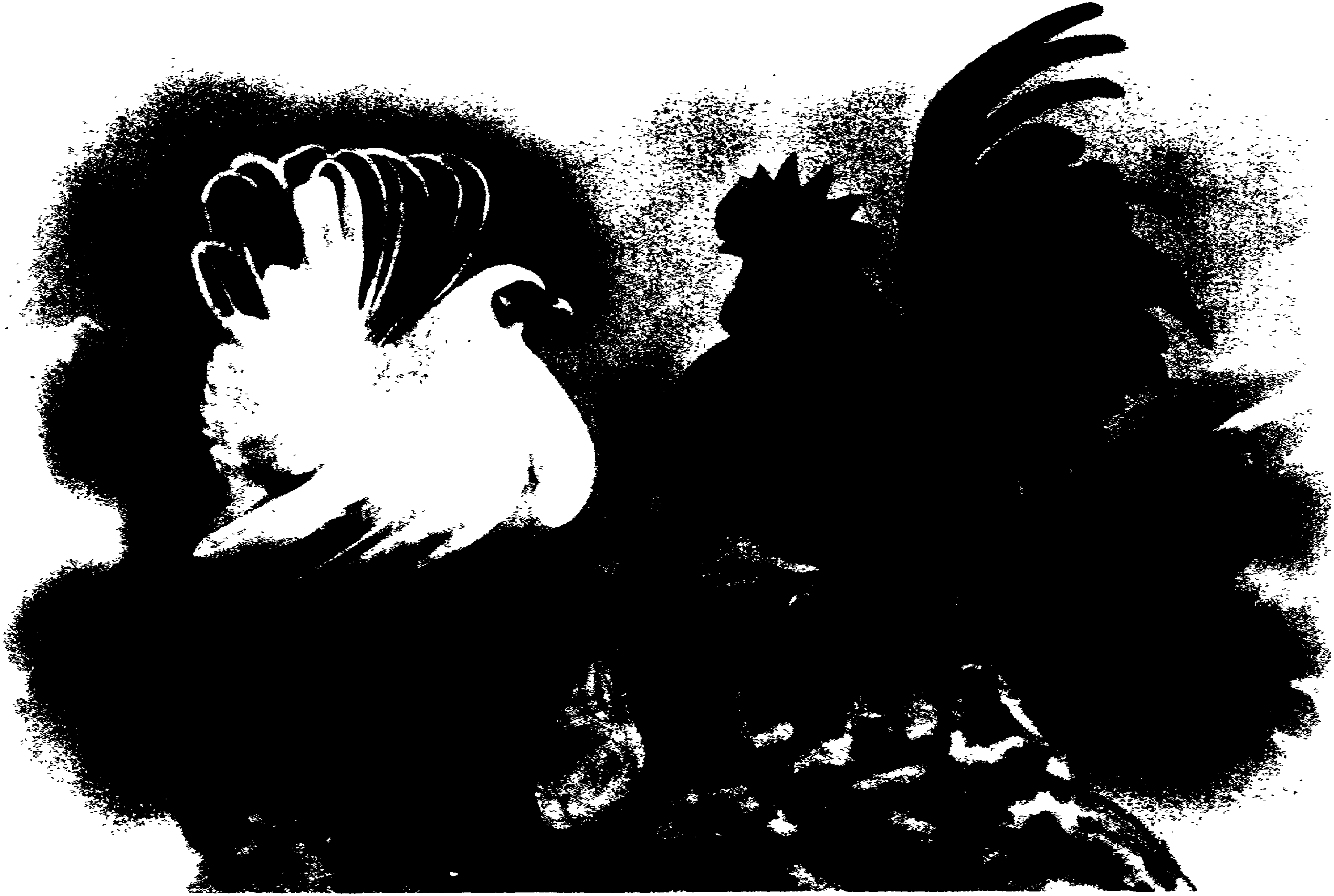
The male bird exerts considerable influence over the outward characteristics, such as shape, size, feathers and general appearance, but at the same time it has some effect upon the economic qualities, such as temperament and fecundity, though in a much smaller degree than is possessed by the hen. There are many cases on record in which a cock from a poor laying strain has been mated with pullets from very prolific parents, with the result that the offspring have proved comparatively poor layers, and the labour of years and the expense of building up a good strain has come to nought. As the cock plays so important a part in determining what the outward characteristics of the progeny will be like it is necessary to select him with care, and the chosen bird should be large, possessing a well-developed frame. By large we do not mean fat, for fat male birds rarely prove satisfactory, rapidly becoming lethargic and dull. In choosing a cock for the production of layers one should be selected that is firm and close in body, of a good size, well developed in the posterior region of the body, clean and tall in the legs and active in habits; for breeding table birds, on the other hand, one should be chosen that is heavy in body, of a good depth, and fairly short on the legs. The hen possesses the greatest influence upon the inward characteristics, such as temperament and fecundity, as well as upon the internal structure and vital organs. The remarks made above with reference to the selection of the male bird apply equally in the case of the hen, and according to whether the progeny is intended for egg production or for table purposes so the birds should be selected. A careful and experienced poultry-keeper, who is fond of his work and who is continually among his flock, is soon able to tell in some measure, from observing certain outward signs, for what a bird is most suited. A hen with a large, bright red comb will probably be a good layer; a small-bodied, active hen, which is constantly at work scratching about for food can generally be depended upon to produce a considerably larger number of eggs than one that is dull and lethargic. Very rarely has a table fowl feathered legs, although there is an exception to this rule—the Faverolles; the tendency among utilitarians, however, seems to be at the present time to breed for the reduction of the leg feathering in this variety, an aim that should be encouraged. One who has lived for years among poultry, and who has devoted a great deal of attention to studying their habits, is able to determine, almost at a glance, by the general look of the bird for what it is most useful. There is often a certain look about a good layer which immediately denotes its chief characteristic, but this knowledge is rather instinctive, and cannot be described.

It is of the greatest importance that only birds that are thoroughly healthy should be used for breeding purposes, because it must never be forgotten that one of the laws of nature is that "like produces like," and thus if the parents possess any faults they are probably reproduced in the offspring, possibly in an intensified form. Thus we find, if parents are used that possess any serious faults regarding shape, economic qualities or health, their chickens will run very grave risk of possessing similar faults. If a bird has a cold, that does not mean it must be allowed no place in the breeding pen, for this is only a small matter, but if a bird possesses any grave organic defects, or if it comes from parents liable to liver disease, tuberculosis, etc., it should not be permitted to breed, for if it does it merely means that the defects are being stamped upon the progeny.

The wise poultry-keeper always retains the best of his chickens for his own use, no matter how tempting may be the prices he is offered for them. Only in this manner can he hope to build up a really good strain. But apart from the fact that the finest specimens should be retained, there is another important consideration, namely, which are the birds most likely to be of service for the particular purpose the poultry-keeper has in view? If he is desirous of producing good layers, he must select birds that are specially strong in this particular direction; the same with table chickens, and with birds of the general-purpose type. A law of Nature, upon which absolute reliance may be placed, assists us very materially in this respect. Put into ordinary language the law is that

(*The Encyclopædia of Poultry.*)

PLATE NO. 14

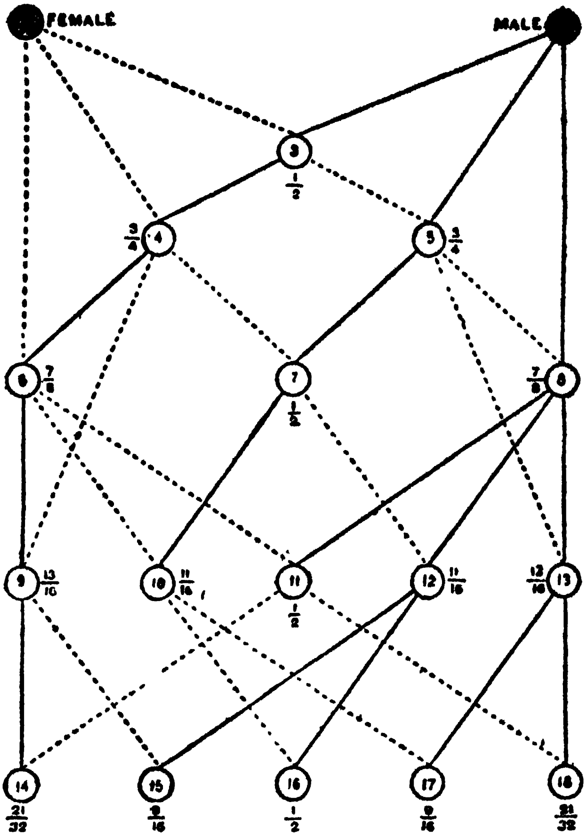


Black Pointed Japanese Bantam Hen and Black Japanese Bantam Cock.

(*The property of Mr. P. D. Williams, Lanarth, St. Keverne, R.S.O., Cornwall.*)

The Black Cock won 1st Palace, 1908. The Black-pointed Hen 1st Palace and Variety Bantam Club Challenge Bowl, 1908.

the more any part of the body is used, the larger and stronger it becomes, while the less it is used, the weaker and smaller it becomes. That is to say that a man who spends all his time doing manual labour increases the strength of his muscles and sinews, while his brain does not develop in the same proportion; a man who devotes all his energies to head work increases the power of his brain, while his muscles decrease in strength. Applying this law to poultry, we find that the better layer a bird is, the larger are the egg organs; if edible qualities are its chief characteristic, the breast is well developed; while if it is evenly balanced, we know at once it is what is termed a general-purpose fowl—that is, good all round. Such a bird is a better layer than a table breed, but it does not possess such good edible properties; it is better upon the table than a laying breed, but it produces fewer eggs. By means of this law, it is possible to select the breeding stock with far greater certainty than would otherwise be the case, and from quite a large flock the best layers, the best table fowls, or the most suitable all-round birds can be chosen.



Felch's Breeding Chart.

BREEDING CHART. "Felch's Breeding Chart," which is given here, shows how an immense number of chickens, of three distinct strains, can be produced from a single pair of fowls, retaining the vigour, size and colour of the original pair. Mr. Felch is a well-known American breeder, who has devoted much time and study to this extremely important question, and his chart is a very valuable one. It is not easy at first sight to follow the breeding chart, but the following explanation assists one in its elucidation. Each dotted line represents the female, and the solid line shows the male, as having been taken from the indicated group. Each circle represents the progeny, to wit, female No. 1 mated with male No. 2 have produced No. 3, which is one-half the blood of sire and dam. Females from group No. 3 mated back to their own sire No. 2 have produced group 5, which is three-fourths of the blood of the dam No. 1. A male from group No. 3 mated back to his own dam No. 1 produces group No. 4, which is three-fourths of the blood of dam No. 1, and one-fourth of the blood of the sire No. 2. Again, we select a cockerel from group No. 5, with a pullet from group No. 4, or *vice versa*, which will produce group No. 7, which is mathematically half the blood of the original pair, No. 1 and No. 2. This is the second step in the direction of producing a new strain. Females from No. 5 mated back to the original No. 2 produce group 8, that are seven-eighths the blood of No. 2, and a cockerel from No. 4 mated back to the original dam No. 1 produces group No. 6 —that is, seven-eighths the blood of the original dam and only one-eighth the blood of the original sire. Again we select a male from No. 8 and females from No. 6, and for the third time produce chicks (in No. 11) that are half the blood of the original pair. This is the third step and the ninth mating in recovering a complete breeding of our new strain, In all this we have not broken the line of sires, for every one has come from a group in which the preponderance of blood was that of the original sire. Nos. 8, 13 and 18 are virtually the blood of No. 2. We have reached a point where we would establish a male line whose blood is virtually that of the original dam, and we now select from No. 6 a male which we have to mate with a female from No. 4, and produce group 9, which is thirteen-sixteenths the blood of the original dam No. 1 and three-sixteenths the blood of the original sire. Again, we select a male from No. 9 and a female of the new strain No. 11 and produce group 14, which becomes twenty-one thirty-seconds of the blood of the original dam, thus preserving her strain of blood. A male from No. 13, which is thirteen-sixteenths of the blood of the original sire No. 2, mated to females from No. 10, which is five-sixteenths the blood of the original sire No. 2, gives group 17, which is nine-sixteenths the blood of the said sire. While in No. 16 we have the new strain, and in No. 18 the strain of our original sire No. 2, we have three distinct strains, and by this system we can go on breeding for all time to come.

—— **IN-BREEDING.** A point that is much debated by practical poultry-keepers is whether it is wise to employ related birds in the breeding pen. Some tell us that it is a foolish policy to pursue, while others declare there is no danger in the plan and that finer chickens are produced thereby. If in-breeding is carried out by a fully experienced person no harm ensues, but it is absolutely fatal to success if it is done in a careless or indiscriminate manner. It should never be forgotten, however, that one injudicious mating may spoil the careful breeding and selection of many years. We want to point out the effects of careless in-breeding, and the dangers that must be faced by everyone when they are using related birds. It is sometimes found necessary to use related stock birds, and, whether the poultry-keeper likes it or not he is bound by circumstances to do so. Say, for instance, a man is introducing a new breed –a very lucrative branch, if successful, but one that entails years of hard work. He will probably be forced to use, perhaps, full brothers and sisters in the breeding pen. The same is true in establishing a new colour, or in introducing a new variety of an existing breed ; whether he wishes to in-breed or not, he has no other alternative.

One of the most serious effects of consanguinity is the liability of the hens to produce infertile eggs, and particularly is this the case early in the season, when eggs are scarce, and consequently, extremely valuable. Even though the eggs are not actually sterile, it often happens that the germs are so weak that they die during the early stages of incubation, or else the chickens, when hatched, are delicate and sickly. If should be a rule among all poultrymen to introduce fresh blood into the yard every year ; but at the same time it is necessary to see that this is not carelessly done, as much injury to the strain may be caused in this manner. Say, for example, one had been building up a laying strain for many years past, and had attained a good average ; if a male bird were purchased to go with these hens, irrespective of its qualities, and from a breeder, perhaps, who had not made a speciality of the number of eggs produced, then serious harm might be done to the pen.

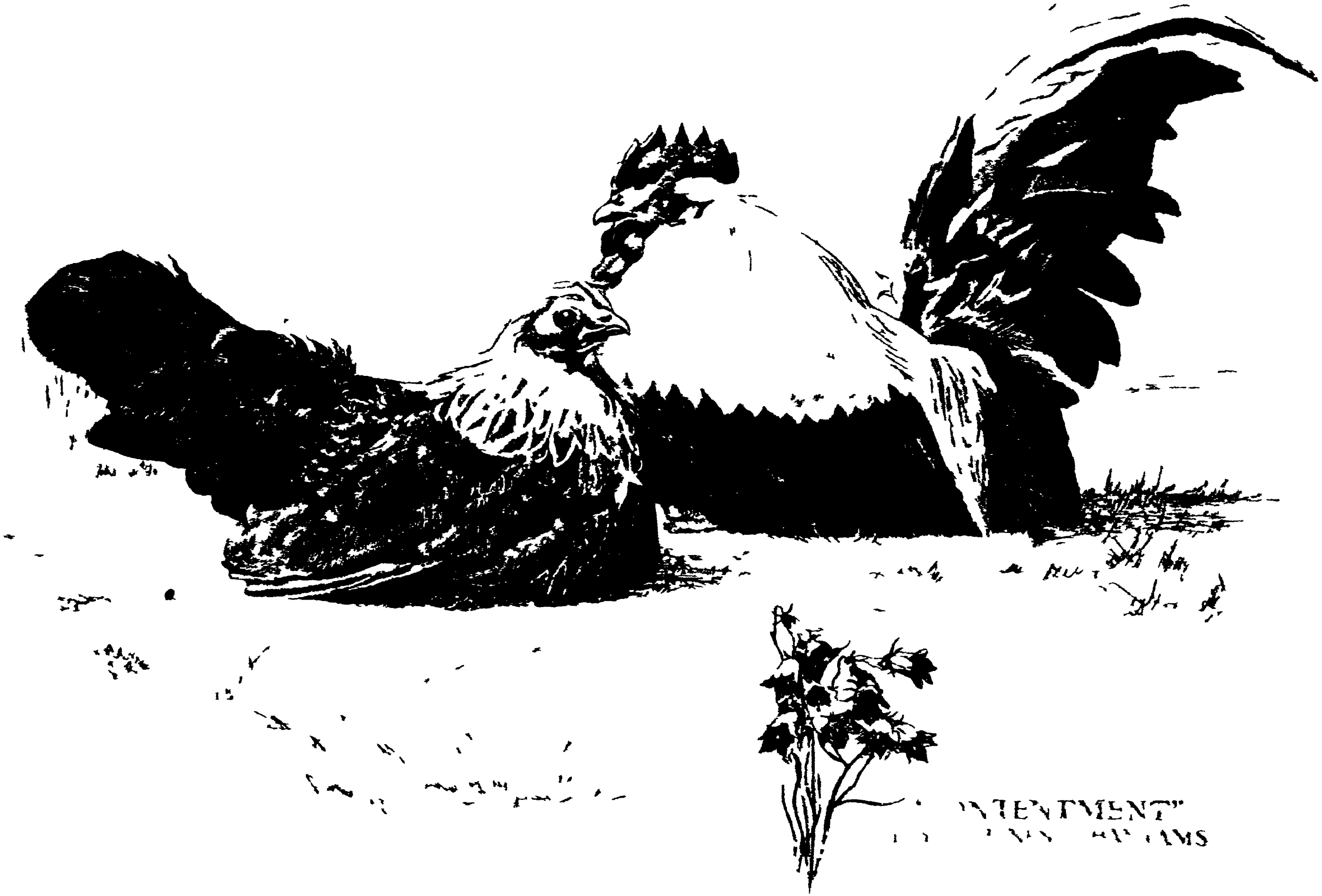
It is, of course, a fact that the male bird influences more the outward characteristics, the hen the inward; but, at the same time, the cock does to a certain extent influence the economic qualities. Therefore, in obtaining a fresh stock-bird, care has to be taken to find out that it comes from a strain that is strong in utility characteristics. As already indicated, apart from the fact that in-breeding causes many of the eggs to be infertile, it also results in making the chickens delicate and difficult to rear. Especially is this the case when the conditions are at all unfavourable. In very cold or exposed situations, on heavy clay soil, or in a damp, low-lying position, the successful rearing of chickens from related parents becomes well nigh impossible. Many times we have come across cases in which the young stock were dying off quickly for no apparent reason. The feeding and housing were quite satisfactory, and all the many satisfactory details of rearing were faithfully carried out; and yet, nothwithstanding all this, the chickens practically refused to live. Upon careful inquiry being made, the exciting cause of the trouble was found to be consanguinity. In-breeding also has the effect of making the offspring more liable to disease, as it weakens the constitution and impairs the health. In-bred chickens grow slower, and ultimately attain a considerably smaller size, than they would had the parents been quite unrelated. When one is building up a laying strain it is very important indeed to use only unrelated birds, for there are few things that sooner spoil the productiveness of a flock than continual in-breeding. Fanciers—and these are the men who mostly run the dangers of in-breeding—do not, as a general rule, mind very much if they spoil to some extent the productiveness of their hens. Of course, they do not try to do so, for the fewer eggs they procure, the less profit or greater loss they make; but it is not a matter of such great importance as it is to the utilitarian who depends entirely upon his supply of eggs. It is not always easy, when one has several pens of the same variety, to keep the chickens apart, but if they are to be used for breeding purposes or for selling in the autumn for stock, then they must be kept separate, otherwise pullets and cockerels from the same parents may be mated together. The best plan—and, in the long run, the simplest –is to ring the birds of different pens in such a manner that they can be immediately detected. Say, one has four pens of Buff Orpingtons, and it is necessary to know which chickens are from which parents; those from No. 1 pen would be ringed on the left leg, those from No. 2 on the right, those from No. 3 on both legs, and those from No. 4 on neither. In such manner the chickens from a large number of pens can be kept quite distinct.

— - — **OUT-BREEDING.** The great reputation that England possesses as a breeder of the finest stock in the world, including all classes of animals and birds, is largely due to the fact that we pride ourselves upon maintaining the different breeds quite pure. In many other lands the same attention is not devoted to the maintenance of the stock in a pure state, and they are allowed to breed indiscriminately with one another. While this retention of our stock in a pure state is an excellent feature it has a very decided danger, namely, that the refinement of race may be carried to an extreme. There are several breeds of poultry, to take only one class of stock, that have been greatly enfeebled by too fine breeding or perhaps breeding for some special features. We are not condemning pure-bred stock, for we fully realize its vast importance, but we would merely utter a word of warning, as it must not be carried to too great an extreme. Not only does too fine breeding result in the enfeeblement of the frame and constitution, but the economic qualities are greatly impaired. We may take, for example, such breeds as the Brahma, the White-Faced Spanish, or the Cochin, which are to-day practically valueless to the utilitarian. It is found that when too much attention is devoted to the external characteristics, when in-breeding is practised to too great an extent, or when the birds are too finely bred, the economic qualities are greatly impaired. It is for this reason that the new breeds, so many of which have been introduced during the last few years, are to be so greatly welcomed, for in the formation of a new breed several different varieties have to be intermingled, which has an excellent effect upon the health and stamina of the offspring. The majority of the present-day breeds of poultry owe some part of their characteristics to alien blood, and particularly serviceable in this direction is the introduction of yellow blood -birds possessing yellow flesh and legs. Birds of this description are usually the hardiest of any, and crossed with another breed produce strong and healthy chickens.

By means of what is termed out-breeding, a great deal can be done in the way of retaining the hardiness and vitality of a breed. It is commonly supposed, and we think it is a correct supposition, that the Dorking breed—one of the oldest there is—had some alien blood introduced therein, and there is little doubt that had the cross not taken place the breed would have degenerated. For a few years after the introduction of the alien blood there were some injurious effects noticeable, particularly in the colour of the plumage, the increase of bone, and lack of pure whiteness in the legs. Another interesting case is that of the Pekin duck in America. A few years ago a dash of Aylesbury blood was introduced in order to give it the rapid growth that is so distinguishing a feature of the Aylesbury. This has had a most excellent effect, and we find that as a consequence the America Pekin develops more rapidly than the English type. The infusion of alien blood has to be done very carefully indeed, otherwise the whole character of the race may be changed. Such crosses, too, must be done very seldom, certainly not more often than once in about twenty-five years. Discussing this question, Mr. Edward Brown tells of an extremely interesting case that came under his own notice some years ago. He says: It is evident that out-crossing must be carried out very carefully indeed in order that its injurious effects may be minimized, and birds of what may be termed a sympathetic nature should always be employed. Such crossing is not necessary for exhibition purposes, because in that case it is often true that the greater the refinement the more perfect the external characters. What is meant by a sympathetic nature is indicated in the following example: About twenty years ago there was introduced into the Brown Leghorn a touch of Black Red Game blood with the object of increasing the brilliancy of the plumage. The result desired was achieved, but at the expense of size, of fecundity, and of the typical characteristics of the race. The effects of this cross are yet seen, and the Brown Leghorn of to-day is different from those met with twenty-five years ago. With the sole exception of colour, every quality was antagonistic. Leghorns are soft feathered, whilst Game are hard in plumage; Leghorns are good layers, Game only moderate in that respect; Leghorns are poor table fowl, Game are good in flesh properties; Leghorns are round in body and shortish in the leg, Game are upright and long in leg. Thus everything was sacrificed to colour, in itself an artificial point. For a time we had brilliant-coloured Brown Leghorns, but little better in size than Bantams, and showing hardly anything of the Italian type. It is out-crosses of this kind that are to be deprecated. Recently there has been a good deal of crossing between the Black Minorca and

(The Encyclopædia of Poultry.)

PLATE No. 15



Grey Japanese Bantams.

(The property of Mr Frank E Rice Wivenhoe Hotel Burgh St Peter's Beccles)

Both winners of 1st Crystal Palace 1st Dairy Show 1st Birmingham 1st Wolverhampton 1st Paisley 1st Club Shows etc

the Black Hamburgh, but here we have two breeds which are largely in sympathy, and if a touch of fresh blood were necessary to maintain the vigour of the Minorca, the Black Hamburgh was the most suitable breed for the purpose, offering the line of least resistance.

—— **CROSS-BREEDING.** Cross-breeding is quite distinct from out-breeding, as in this case the idea is to mate together two birds of different breeds, in order to combine, if possible, the good qualities of both. To the fancier, of course, only pure-bred fowls possess any value whatever. To him cross-bred birds or mongrels are of no account; as he intends to breed his fowls to altogether a different standard from that of the utility man; a bird that is not perfectly true to type is merely occupying space, consuming food, and involving a certain amount of labour from which he can expect no return. To the farmer or the purely utilitarian poultry-keeper, however, it is the economic qualities and not the outward characteristics that appeal, and it does not matter to him whether the bird possesses every show point wrong so long as it is a good stock-getter, a good layer, or has fine-quality flesh and a good breast development. If, therefore, a cross-bred is likely to prove of more service in one of these directions the probability is that it will have the preference over a true-to-type bird. It is necessary in this connection to draw, at the very outset, a distinct line between cross-breeds and mongrels, as the two are totally different. A mongrel, which should on no account have a place in any farmer's poultry yard, is a bird that contains the blood of innumerable varieties in its veins, no particular object having been aimed at in selecting the parents. A cross-bred on the other hand, is one that contains the blood of two distinct varieties, but where the breeder has had a special aim in view, and where care and attention have been bestowed upon the selection of its ancestors. For some purposes, and in some localities, cross-bred fowls are to be recommended, while there are many cases in which pure-breeds possess the advantage. Very briefly stated, the advantages of crossing are that it is possible to minimise defects of an otherwise useful variety; that it is possible to combine in one bird the good qualities of two breeds, and that the chickens are hardier and better able to withstand rough treatment. The advantages of using pure stock are that the breeder knows more or less exactly what his chickens will be like; that pure-bred fowls always possess a much greater selling value; that the time his chickens will take to reach maturity can be more nearly calculated; that there is always a chance of breeding a particularly fine specimen, worth a good deal of money; and, lastly, where eggs, day-old chickens or stock birds are the main business, it is undoubtedly more profitable to keep pure-bred breeding stock, as these cost no more to house and feed, and their offspring fetch much better prices. One of the most important points to bear in mind when crossing is that it is next to useless to cross breeds possessing similar characteristics. The only advantage of so doing is that the offspring are more likely to be hardy and vigorous, for, as we have already mentioned, one of the effects of mating different varieties is that the chickens produced therefrom are extremely hardy. It is of little use, for instance, mating White Leghorns with Black Minorcas, for both breeds possess identically the same economic qualities.

—— **LAYING STRAINS.** Fifty or more years ago, when the utility qualities of poultry were the only features for which they were valued and selected, it is probable that greater prolificacy was exhibited by the average nondescript farmyard hen than has been the case of recent years. With the advent of shows and the remunerative prices forthcoming for eggs and chickens from prize birds, numbers of breeders concentrated their endeavours on the production of birds with peculiarities of feather and totally ignored all useful qualities. Pure-bred cocks from exhibition strains became distributed over the country under the mistaken idea that they would improve existing stocks, with the result that in the course of time an appreciable diminution in the supply of new-laid eggs was apparent to the householder. With a better knowledge of the influences of heredity on egg production efforts are now being made to re-establish utility strains, and one of the first advances made is a more general recognition that prize birds and utility birds are absolutely distinct and must be kept as carefully apart as two distinct breeds.

In founding a laying strain no feature but prolificacy must be taken into consideration. The capacity for egg production is hereditary, like every other characteristic, and by using trap nests, keeping a close record of the produce of each hen—the number of eggs laid in the year, the age at which she commences laying, the months in which she lays, etc.—and then keeping for a future season only the progeny of those individuals with the best record, an improvement in a strain is quickly made.

It is believed that the average hen starts life with a capital, so to speak, of some five or six hundred germs in her ovary. Normally these would enable her to be productive for the greater part of her natural life--ten or more years—but as forty or fifty eggs laid in the spring annually by a hen will not pay for her keep, the object of all improvers is to get the greatest number of eggs in the shortest possible time even at the sacrifice of future fertility. Success has been met with so far as to double the number of eggs laid annually by average hens, but there is undoubtedly room for much further improvement. No authenticated case of a stock of hens laying 300 eggs each in a year is on record, and it is only exceptionally that as many as 300 is produced by one individual in her first two seasons. Obviously, in the nature of things, increased productiveness in early life means comparative sterility later, and as every year sees her productiveness lessen it is seldom profitable to keep a hen over her second laying season. The chief points to select for in a laying strain are (1) early maturity; (2) egg laying in winter; (3) number of eggs laid during the first year; (4) size of egg. (1) Under normal conditions a fowl would not commence egg production until she is a year old or thereabouts. In these days one hears occasionally of pullets which have begun to lay when under six months old, and the object of every breeder is to get together a flock which can be relied upon to be in full lay when between six and seven months old. It is a matter chiefly of heredity, and there is no reason why, by careful selection for two or three generations this consummation should not be arrived at. In unselected stocks birds are often eight or ten months or even older before they lay their first egg. (2) It is natural for a fowl to lay in the spring of the year, but by hatching betimes and selecting for early productiveness it is possible to have pullets in lay in the autumn, when older birds are in moult. If they begin to lay before the first frosts they will usually go on through the winter; but frost will often defer a commencement. As the value of autumn eggs is quite double that of those laid in the spring, winter laying is obviously an important factor in the profitableness or otherwise of poultry. It may be added that loose-feathered breeds, like the old-fashioned Langshan, are naturally better winter layers than any of the small tight-feathered Mediterranean breeds. (3) As already stated few flocks can average more than ninety to one hundred eggs per hen per annum. The ultimate object in a laying strain should be to treble this the first year, or to get 400 per bird in the first two seasons. (4) Certain strains of Hamburghs used some years ago to show a remarkable egg record, but their eggs were so small that they realized less than the market price. Size of egg is a point which must be carefully selected for and no egg which weighs less than two ounces should be used for hatching.

It must be understood that egg laying capacity is not a matter of breed. It is solely a matter of selection for this one quality and may be developed or reduced in any variety. In selecting for feather only, as in show strains, the reproductive qualities are usually ignored, hence the notorious deficiencies in this respect apparent in many prize strains. Mongrels or cross-breds, specially bred and selected for their egg-laying powers, may be as prolific as the purest of breeds. It should be added that it is necessary to exercise as careful selection in the choice of the cock as it is of the hens. The bird used must be the progeny of a hen with a great record, as one cross with a male which comes from a strain of indifferent layers will appreciably lower the average of future generations

As to what has been done of late by laying strains in egg-laying competitions the best records so far are those obtained as the result of a two-years' trial concluded in Australia in 1908. The winning pen of six birds were Langshans, bred from birds imported direct from China, which laid 1,481 eggs the first year, 1,006 the second; total 2,487. The second pen were Black Orpingtons, with a record of 1,247 + 1,054; total 2,301. The third pen were White Leghorns, with a record of 1,437 + 841; total 2,278. In the first year no less than fifty-seven pens produced over 1,000 eggs; in the second year, of the forty pens retained for further experiment only two reached a total of 1,000 eggs A favourable climate, no doubt, had some influence upon the remarkable prolificacy of these birds, and when we return to the results of a year's trial under the auspices of the Utility Poultry Club, concluded in England in 1908, a much poorer return is evident. The winning pens were all White Wyandottes, the first three producing 994, 991 and 946 eggs respectively. Two White Wyandottes and three Buff Plymouth Rocks laid over 200 eggs, the former laying 213 and 201, the latter 216, 206 and 203 respectively. In these competitions the value of the eggs (time when they were laid) and their size were rightly taken into consideration in the final scoring.

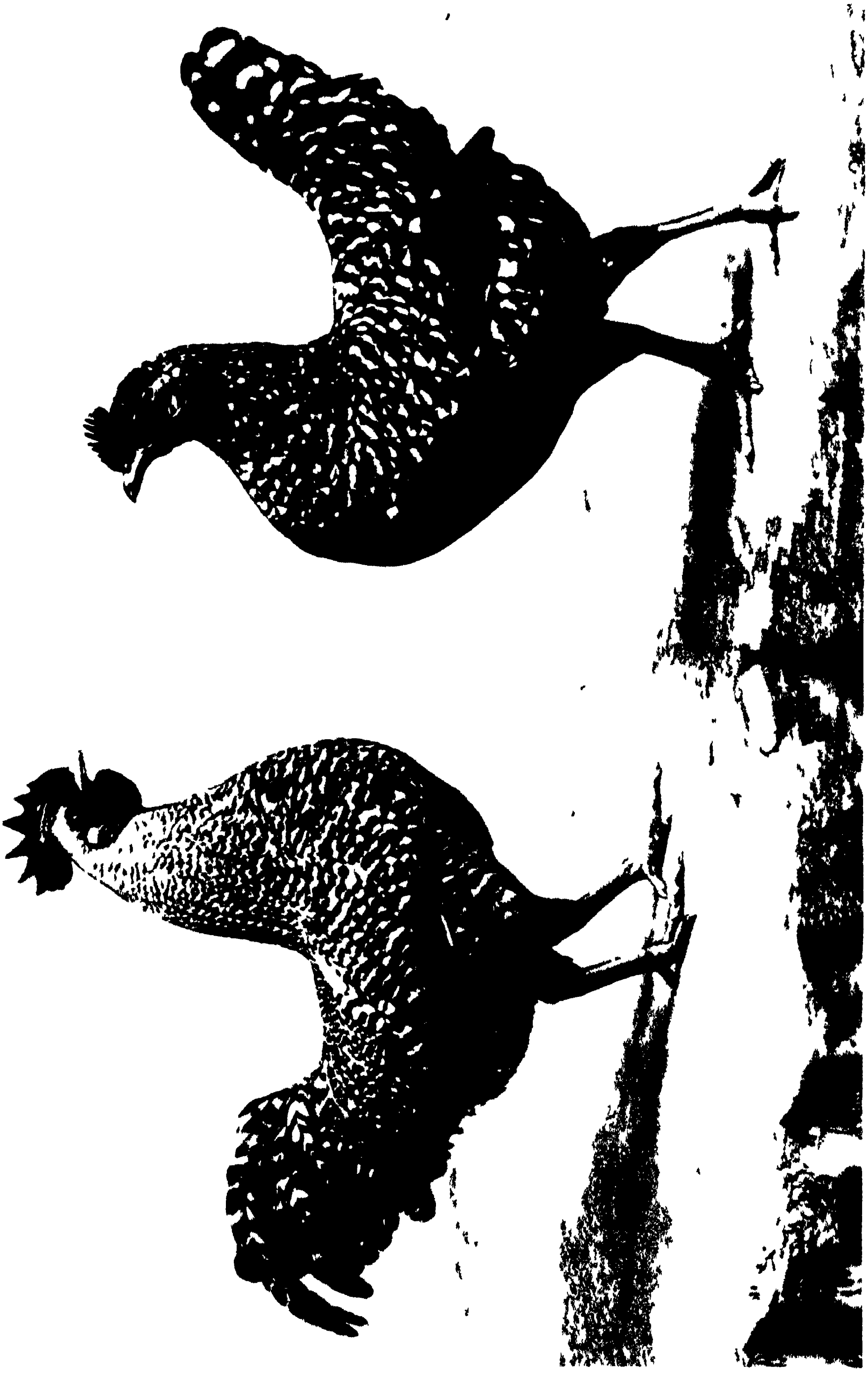
—— **AGE AND EGG PRODUCTION.** The approximate age at which a pullet will commence the production of eggs may be broadly stated to be six months, but this is subject to variations of breed and strain, so that whilst some can scarcely be prevented when they are no more than five months old, others require a great deal of encouragement to induce a start at seven months or older. It must not, however, be concluded that a pullet must of necessity begin to lay at any given age, because although age is an important factor it is dominated to a very considerable extent by the period at which the fowl is hatched, and other considerations, such as the method of feeding, housing and so forth. The hatching date may make a difference of several months in the commencement of production, and although an early hatched bird of a quick maturing variety may begin to lay at the normal period, it frequently happens that the production is of strictly limited duration, being hindered by moulting at an undesirable period; just as, on the other hand, a delay in hatching may necessitate the feeding of the pullet until the following spring, before she attains a profitable productive condition. In either case, the additional feeding involved during an unproductive season is hardly recovered by the subsequent egg yield. Speaking generally, it may be said that February pullets run the risk of an autumn moult; that March is a more natural hatching period, especially for heavy breeds; that April is the most normal for light varieties; and that May-hatched pullets will seldom lay the same year, except in the case of very quick growers, whilst those of later hatching will probably not commence until nine or more months old. A suitable arrangement of laying stock would include pullets hatched in March of the current year, hens hatched in March of the year before, and hens hatched in the same month of a year earlier still; the latter being disposed of in the autumn directly they show signs of going into moult, and the stock renewed every year from the March-hatched birds.

This brings us to the second point, relative to the profitable age of a fowl, and it will be seen from the foregoing that this period terminates at the age of about two and a-half years, provided the hatching date, and consequently the commencement of production, has been correct. Regarding a hen merely as an egg producer, it is unprofitable to keep her after her third autumn, although there may be other reasons making it advisable to do so; one of which would be exhibitional considerations, of which the owner is the best judge. From the point of view of numbers the egg producer finds as a rule that the pullet is more prolific than the hen, and that the first year hen is more profitable than one in the second year; whilst beyond that the profit is lost in a steadily decreasing yield. Some breeders are so confident of the all-round superiority of the pullet, as the maker of the highest profitable percentage that they annually renew their stock of layers, affirming that the higher percentage yielded by the younger fowls more than compensates for the loss sustained in substitution, and that for egg producing purposes alone, one pullet is worth two hens. On the other hand, there is an almost inevitable disadvantage as regards the size of the eggs, and it does not suit every purpose to produce two small eggs instead of one large one; and it must be remembered also that there is no uniformity as regards the comparative yield during the first and second season; although it may be accepted as an established fact, that the largest proportion of the total yield is produced during the first two years. Such an authority as Mr. W. B. Tegetmeier has stated that "it is much better to get rid of hens at the end of their second season of laying than to keep them. The system is exhausted by the great drain upon it which has taken place during the two seasons, and cannot possibly keep up an equal number during the third and fourth."

The reliability and practical utility of estimates of cost of production and probable profit must, however, always be more or less questionable, as an unavoidable consequence of the many and widely differing influencing factors; nevertheless, it is fairly safe to state as a general proposition that in average circumstances birds hatched at a suitable period may be profitably kept, as mere egg producers, during three laying seasons but that as a rule they become improfitable from the time they go into moult in their third autumn. The whole question must, however, be considered in its individual aspect in relation to strain (see Laying-Strains), because, as has been proved by the use of recording nests, there are some fowls that never at any period of their lives produce enough eggs to pay for their food; and on the other hand, there are others with a sufficiently high yield to much more than justify their profitableness on the three years' basis.

—— **FOR CHICKEN PRODUCTION.** It is well known that the breeding of chickens for market is a paying business when carried out on proper lines, but too often a poor class of fowl is used for the purpose.

PLATE No. 16



Barred Plymouth Rock Bantams.

(*The property of Mr James Bateman Milnthorpe Westmorland*)

Cock—Winner of 1st Halton 1st Milnthorpe etc

Hen—Winner of 1st Crystal Palace 1st Plymouth Rock Club Show Leeds 2nd Plymouth Rock Club Show Kendal etc

Mongrels of the worst description are kept in some yards for the breeding of chickens, which must entail loss to those who rear them and a disappointment to those who buy them in the market. To avoid this, care and judgment must be used in selecting the right class of fowl for the purpose. Then methods suitable for the work in hand must be applied. There are certain times of the year when it will not pay to rear chickens for the market; again, there are times when the demand is much greater than the supply, and, therefore, the aim of the chicken producer must be to get his birds hatched out and reared in time to put on the market when they are really wanted by the public.

It is useless for anyone to take up this part of poultry-keeping if they have insufficient space, for, to grow chickens quickly, they must have ample range, and the land must be sweet and fresh. So it is necessary for the poultry-keeper to have land enough to allow some part of it always being free, whereby frequent change may be given. Pure-breeds or first-crosses may be used. There are several to choose from, some being more adapted than others. But the great secret of really good chickens is *quick growth*, and to get this many points have to be considered. Slow-growing chickens will cost more for food than they will realize on the market when finished, and are never so nice for eating when killed for private use. It is imperative to have a flock of stock birds which are known to be quick, hardy growers. Stamina is one great point, the young chicks often having to be reared in the worst months of the year. Taking the pure-breeds first, Sussex, undoubtedly, take the lead—either of the three varieties, light, red or spreckled; there is not much to choose between them. The lights, perhaps, are rather the fastest growers; they mature quickly.

Buff Orpingtons may be taken next. These generally feather well, but do not put on weight so fast as the Sussex. They have, however, nice white flesh, and the texture is fine and good. This fineness of flesh is another point which must not be overlooked when one intends to breed chickens for the market, for better prices will be made if the birds are of good skin and look well when killed. A coarse-skinned chicken never fetches a high price on the market; neither will it ever be awarded a prize at a table poultry show.

The Faverolles is a very useful bird for chicken production, owing to its great hardiness; but the drawback to the breed is coarseness of flesh. It is seldom fine grained.

The Plymouth Rock is a quick, hardy grower, and if it could be bred with white legs would be very useful for the purpose; but having a yellow leg it goes against it as a first-class chicken producer, although it attains a great weight.

Dorking is an excellent breed, but not suitable on every soil. The flesh of this bird is very fine and white in colour. It carries a large long breast, perhaps one of the finest of breast flesh. The chickens are not easy to rear early in the season.

Indian Game. Here again we get a yellow leg and flesh, yet very fine flesh on the breast. The Indian Game is slow of growth, taking much longer to come to maturity than some of the other pure-breeds mentioned.

Old English Game is a good table bird, but of late years we find them much smaller than formerly, and this is much against them as utility fowls. The quality of the flesh is excellent, the flavour being very fine. The chickens are hardy and on most soils easy to rear.

Houdan is not large enough for general purpose, but has white flesh of good texture and fine in flavour. It is not suitable for winter rearing and will not stand a wet soil. There are several good crosses which may be made from some of the pure breeds previously mentioned, and in breeding chickens these crosses are most valuable.

Orpington-Game. Here we get a bird which is hardy, free of growth, and carries fine flesh. The Game being introduced with the Orpington retards size somewhat, but much improves the quality of the flesh. They are ready for immediate use without any artificial feeding. The chickens are hardy and easy to rear.

Sussex-Game. The chickens do not grow so fast as when pure Sussex, but there is an increase of breast flesh, and when crossed, using a Sussex cock with Game hens, will produce mostly all white leg and white fleshed chickens.

Dorking-Game. Here we have a fine cross well known as one of the finest of table chickens; not very fast of growth, but getting great weight when matured. The flesh is white and of good flavour, being excellent in texture.

—— **USEFUL CROSSES.** Cross-breeding is frequently resorted to in egg production with the object of increasing prolificacy, securing greater size in the eggs, and producing a tinted shell —although in some instances the first two objects are attained with some loss in the depth of colour. Relative to the colour consideration, in crossing breeds one of which produces white eggs and the other brown, it is the general rule to depend upon the female side for the preservation of the tinted shell, the male representing the layers of white-shelled eggs. For a suitable combination of colour and prolificacy the following crosses are generally suitable: Leghorn-Langshan, or Minorca-Langshan. Others very frequently used being: Leghorn-Buff Orpington; Minorca-Buff Orpington; Ancona-Buff Orpington, or Leghorn-Plymouth Rock.

For the production of table chickens, especially to secure increased size and additional hardiness in the progeny, usual crosses are between the following breeds: Indian Game-Dorking; Indian Game-Buff Orpington; Dorking-Faverolles; Wyandotte-Dorking; Indian Game-Sussex; Wyandotte-Buff Orpington; Plymouth Rock-Dorking, or Plymouth Rock-Leghorn.

In breeding for ducklings the Pekin may be crossed with the Aylesbury, when the latter has been allowed to deteriorate, and the Aylesbury may be crossed direct with the Indian Runner or with Aylesbury-Indian Runner ducks for the purpose of increasing prolificacy in early production. Breeders of goslings for marketable purposes generally prefer to cross the Toulouse and Embden breeds, rather than breed from either in a pure state.

In the selection of individuals for crossing for egg production, the strain from which the birds are derived is of greater importance than breed—the latter being chiefly of importance as indicating general characteristics, such as the size of the eggs and the colour of the shell produced by the average of the breed. In selecting for table qualities, whilst the breeds selected for crossing must also necessarily bear evidence of their general suitability and carry some reputation for the required characters, the individuals must primarily be chosen for their shape and size, preference being given to those with a good breast development, and length, breadth and straightnes of back. Whilst it may be allowable to use, for such strictly useful purposes, birds that are defective in the markings and other ornamental requirements of their exhibitional standards, those that are defective or deformed in any such way as crookedness of the breast bone, lameness, or so forth, must be rigidly rejected. Although mongrels may be admitted to possess all the possibilities of pure breeds and first-crosses, as regards egg production, the breeding of mongrels for table production is quite undesirable. For that purpose, when crosses are used, the breeding must be restricted to first-crosses, either renewing the stock each year or mating a male of the two original breeds alternately year after year, the latter method being the easier, but the less satisfactory inasmuch as the balance is not evenly maintained.

—— **FOR EXHIBITION.** The art of breeding can only be learned by experience, for though many people possess the instinctive faculty, it can only be applied successfully when there is sound practical knowledge to back it up. One of the fascinations of breeding for exhibition is its uncertainty, and, therefore, although there are certain principles which underlie the whole matter and need to be thoroughly understood, it is quite impossible to lay down general rules regarding the all-important details, since every case has to be considered on its merits. Supposing that a fancier came to us for advice regarding the mating of his stock, we should first of all enquire of their pedigree, since to know how birds are bred is one of the secrets in the art of breeding. That is the first principle, for upon the way that birds are bred depends their future mating. The second principle is to stick to the one strain, which, in other words, is in-breeding.

This in-breeding is the *bête noir* of many poultry-keepers, because, whatever one may say, it must inevitably lead to degeneracy, and unless one is careful it may lead there very quickly. But, on the other hand, it may be seen that there are many exhibition strains which have been in-bred for a number of years, and in which the hens are good layers, the chickens sturdy and quick growers, and the stock large and vigorous. The wonder is how all this is maintained year after year whilst in-breeding is persisted in, and it is just one branch of the art of breeding, for it will invariably be found that it is the careless in-breeder whose stock becomes degenerate. It is, therefore, necessary to remember in this connection that if we breed from a bird with any physical defect, in-breeding will perpetuate that defect and possibly ruin the strain. That is why clever breeders who look far ahead make such a strong feature of rigour and general health in their breeders.

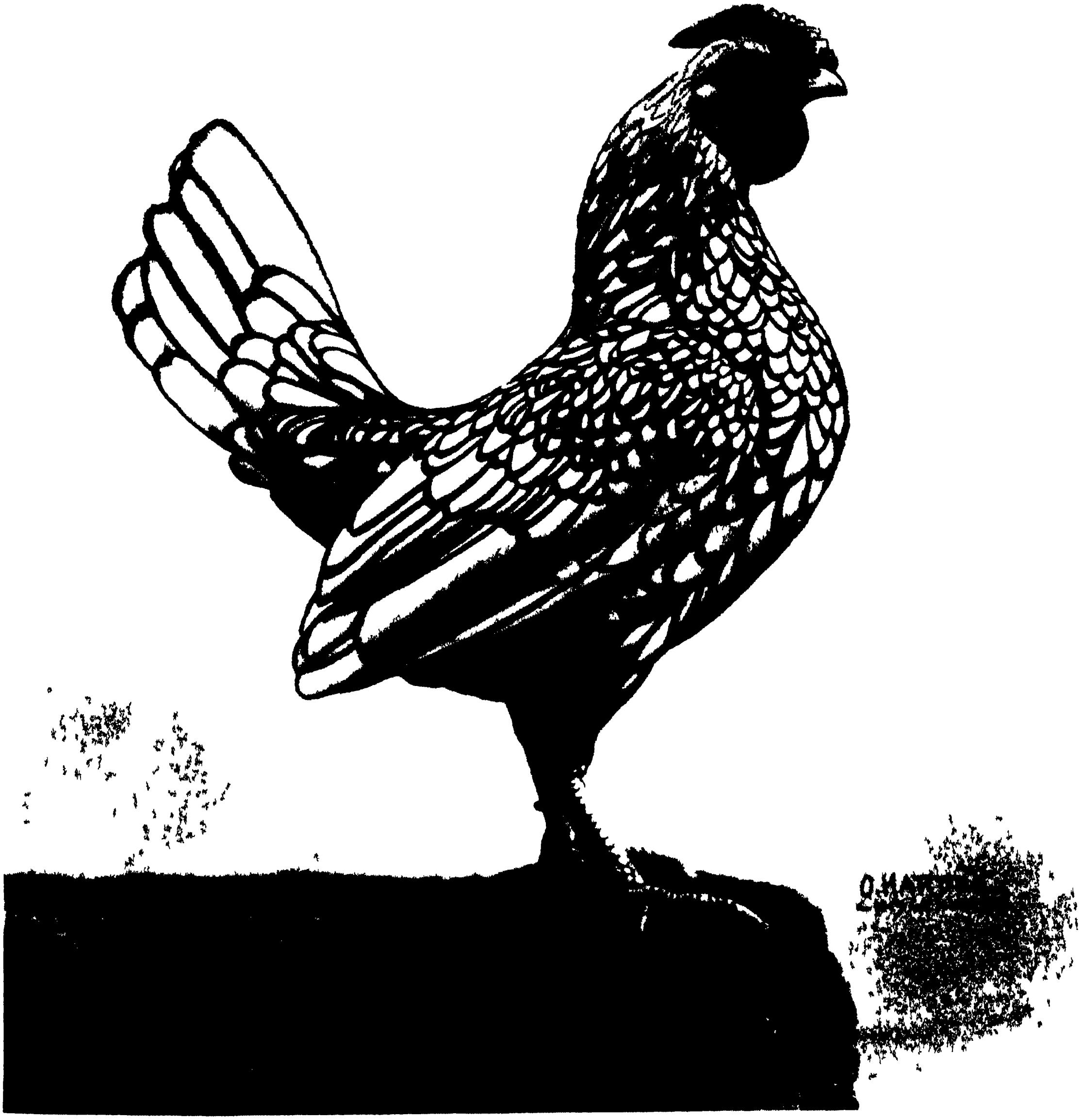
But it is useless attempting to breed for exhibition unless the principle of in-breeding is adopted, for this reason: Exhibition points are elusive, and when they are obtained the only way to fix them and make them permanent characteristics is to breed closely. Until the desired points have been secured there is no advantage in in-breeding, and judicious crosses are more likely to produce the results required. Supposing, for instance, that we are starting with a new variety to perfect some characteristics. Judicious crosses may help us to the points required, but as soon as we arrive within sight of those points we must cease crossing, or we may lose them again, and endeavour to fix them by breeding closely among the birds that possess them. In many of the best exhibition strains the introduction of unrelated blood of the same breed would cause havoc and reversion to old defects. All the work of many years would be undone by that one season's breeding, and that is why many people who commence by purchasing expensive stock fail in breeding, because they do not recognise the importance of the principle of in-breeding, and, therefore, do not take sufficient care to ensure a proper mating.

We have already stated that it is necessary to know how stock are bred, and that is part of the great principle of pedigree breeding. Without knowing how stock are bred one cannot breed to pedigree, which is the most certain method of perpetuating any given characteristics. When we know just how a bird is bred, and all detail concerning its parentage, we are in a good position to form an idea what it will breed in turn, and how it should be mated. Consequently we must keep an accurate record of the parentage of each chicken we breed, so that at the end of the season, when the results are to be seen, we have a key to the whole proceedings and a reliable guide to future operations. This entails much care and labour, but the following plan will be found to achieve the desired result. Each bird in the breeding pen should wear a numbered ring. We will suppose that we have six hens numbered 1 to 6, and that we use three cocks during the breeding season, changing them every month, which is a good plan when, as in many cases, matings are uncertain, since it gives more opportunities of happening upon the correct mating. These cocks we mark A, B and C. By means of trap nests there is no difficulty in distinguishing the eggs laid by each hen, and these are marked A1, A2 or A6, as the case may be, showing the parents on either side. At hatching time it is advisable to have all the eggs of one hen in one nest, otherwise it is difficult to mark the chickens correctly, though in incubators partitions can be set up in the trays to prevent the birds mixing. In any case as the chickens hatch they should be marked to correspond with the figures on the eggs, and the simplest plan is to use small india-rubber rings of various colours (each colour to denote a particular number,) which rings must be replaced in a few weeks by metal rings bearing numbers. The numbers are then entered up in a book, and at the end of the season we have but to examine the ring on a bird's leg and look up the number in the book to find out which are its parents. We may add that attention must be paid to the rings, and very often it is necessary to substitute larger ones as the chickens grow. Then again, when we change the cock we must allow approximately three weeks to elapse before we credit the progeny to the new cock.

There is another great principle that underlies the whole art of breeding, and that is commonly known as double-mating. This, in brief, is the mating of separate pens to produce cockerels and pullets respectively, and it has been brought about by the keenness of modern competition. There are, it will be remembered, a number of breeds in which the males differ considerably from the females. Take the Partridge Cochin, for instance, in which the male has a bright coloured top and sound black breast, and the female clear black pencilling on a brown ground. Years ago breeders were content with the single mating, and produced exhibition specimens of both sexes from the same pen. But since that time the standard of show specimens has become higher, and breeders have discovered that by going to the expense and trouble of keeping separate pens to produce show birds of each sex they can more surely perfect the characteristics of the breed. Nor is it only in connection with breeds in which the sexes differ that double-mating has been adopted, for in many other varieties in which the cock and hen have the same colour and marking double-mating has been found to give improved results from the show point of view, though complicating the labour and creating some waste. For it must be remembered that among the progeny of a pen devoted to cockerel breeding only the males are likely to be of any use in the show pen. The females have their value, of course, since they must be used again as cock-breeders; but as far as exhibition purposes are concerned, they are so much waste produce. The same may be said of the cockerels in the pullet-breeding strains.

In connection with double-mating, it is of the greatest importance that stock should actually belong to cockerel or pullet-breeding strains, as the case may be. In some cases an inferior exhibition cock may look like a pullet-breeder, or a poor specimen of an exhibition hen like a cock-breeder, but those birds would not breed good pullets or cockerels, as the case might be, because

PLATE No. 17



Silver Sebright Bantam Cock.

(The property of Mr Harold Porritt Netherwood Grange over Sands.)

Winner of 1st Tredegar 1908 etc.

the blood would not be right. And in breeding the blood is everything. Sometimes we have been asked what a good pullet-breeder or cock-breeder of a particular variety should look like, and we have endeavoured to explain the characteristics that generally indicate a likely breeder, though we have been compelled to add that all this would not be sufficient unless the blood was right, since on many occasions we have known birds that did not look like good breeders to produce the best chickens, simply because in this case the blood was right. In any case, this points to the necessity of keeping cockerel and pullet-breeding strains distinct, for if they were allowed to mix without proper precautions being taken to identify them, confusion and failure would result.

Let us take the Partridge Cochin as an example, and show how the principle of double-mating is applied. If we were desirous of breeding cocks we should choose the most perfect male specimen we could obtain, and mate him with large shapely hens of a genuine cock strain. Unlike the exhibition hens they would have no distinct pencilling, but would be of a dull brown colour, with lemon hackles and a broad black stripe down the centre, since the clearly striped hackle is one of the characteristics of the cock. Then, if we were breeding pullets, our pen would contain the most typical exhibition females obtainable, with clear pencilling all over the body and fluff. But the male to run with them would be a member of the same pullet-breeding strain, and would differ from the exhibition cock, in that his breast, instead of being rich sheeny black, would be ticked all over with red, which would extend down the fluff and leg feather, whilst his hackle, instead of being clearly and soundly striped, would probably show traces of pencilling, denoting his pullet-bred origin. It will thus be seen that in breeding exhibition poultry like does not produce like, and if we were to mate the best cock and hen together we should merely breed rubbish. We are compelled to adopt round-about measures, and though much extra labour is entailed, the end amply justifies the means. But though we have quoted the Partridge Cochin as an example, it must be remembered that each breed has its own particular characteristics, and must be dealt with on its merits. In breeding black fowls with yellow legs, for instance, such as Black Leghorns or Black Wyandottes, we use a cockerel that is light in undercolour and often white in tail (a bad fault in a show bird) to produce good pullets, because in such a bird we get better leg colour and his light undercolour imparts a richer sheen to the plumage of the pullets, which will not necessarily be light in undercolour also. And in breeding Buff Orpingtons we use a dark-coloured cock to produce the best exhibition pullets, because the tendency in this colour is for the progeny, especially pullets, to become lighter than the parents. Likewise in some of the large-combed breeds, like Minorcas, we breed the best headed pullets from a cockerel whose large, deeply serrated comb droops over in a way that spoils him for the show pen, and our best headed cockerels from hens whose combs are largely and firmly set, without the graceful fold that distinguishes the exhibition hen. These are some of the many ramifications of the double-mating principle, and will be sufficient to demonstrate its importance. There are still a few breeds, among which White Wyandottes and Black Orpingtons may be mentioned as noteworthy examples, in which there has been found no necessity, up to the present, to depart from the principle of mating one pen to produce both sexes in perfection.

Beyond this it would be impossible to amplify the question of breeding without taking each breed and sub-variety in turn and dealing with it on its merits, because the details vary in each, and these details are all-important. But to the fancier who desires to learn the art of breeding we would recommend that he first of all makes himself acquainted with the great underlying principles, and then makes a close study of his own particular variety. By applying the general principles to the special exigencies of the variety in hand he will be most likely to attain satisfactory results. We may add that the greatest breeders of our time have been specialists, who have devoted themselves to one or two varieties and mastered them. The fancier who attempts to keep half-a-dozen or more exhibition varieties is generally a Jack-of-all-breeds and seldom becomes master of one.

BREEDS — VARIATIONS AND CLASSIFICATION. There is no greater mystery in nature than the variations that occur between the breeds of poultry, to say nothing of the vast differences that occur even between the varieties of the same breed. Two eggs are exactly similar in all respects, in colour, shape and size, and yet from the one there is produced a bird that is jet black, while from the other is hatched a chicken containing all the colours of the rainbow in its plumage; from one egg a cockerel is hatched, from the other a pullet; from one egg a laying or non-sitting bird, from the other a general purpose or a table bird. Many have been the attempts to solve this wonderful mystery, but so far without success. In " Races of Domestic Poultry," Mr. Edward Brown, the author, makes some extremely interesting observations in regard to this matter, and discusses the question at some length. In spite of the fact, he writes, that there is a constant tendency to variation in all poultry, increasingly so when domesticated, like produces like to a remarkable extent. and is the sheet-anchor of the breeder, otherwise he would never know what would be the result of his efforts. If he mates Dorkings, he obtains Dorkings. Rouen ducks produce him the same, and so on. There may be variations in minor directions, capable of increase and perpetuation, but they are minor and most pronounced in merely artificial characters. Generally speaking, the progeny will resemble the parents, not only in type, but in character and quality. As we have already seen, variations and the evolution of breeds and varieties, inclusive of increased size and fecundity, are largely due to change of conditions. As Darwin has so well said " Man has no power of altering the absolute conditions of life; he cannot change the climate of any country; he adds no new element to the soil; but he can remove an animal or plant from one climate or soil to another, and give it food on which it did not subsist in its natural state. . . . . He unintentionally exposes his animals and plants to various conditions of life, and variability supervenes, which he cannot even prevent or check." That the tendency to variation is weakened where the fowls are bred under the same conditions for generations is within the observation of all breeders, as also is the further fact that fixity of type and of colour is greater in accordance with the length of time during which breeding has been conducted on the same lines. In that way we may find an explanation why certain types are so persistent. These have been bred for many generations, and maintain their influence. We find this in men and in all classes of animals. Among some races of exhibition poultry it is often carried to such an extreme in the development of artificial points that everything is sacrificed to that end, and the virility of the breed almost destroyed. With all pure races there is a tendency to work out, to exhaust their vigour by general enfeeblement.

Until within the last few years a hen was merely regarded by the vast majority of poultry-keepers as a hen, and no particular attention was paid to its special characteristics or economic qualities.

To-day, however, the importance of specialization (and hence the need of knowing in what quality a bird excels) is more fully realized, and on all sides we see how great an improvement is taking place in this direction. In order to improve the quality of one's poultry it is essential to have a guide by which the selection of the breeding stock can be accurately made, and nothing must be left to chance. We know that certain breeds are more useful for one purpose than for another, and while, to a very limited extent, this proves of assistance it is by no means sufficient, because the important question of strain is one that has to be carefully considered, as it has so great a bearing upon the results achieved. It is extremely difficult to describe in so many words the exact meaning of the word strain, but perhaps an example will serve the purpose better than a definition can possibly do. Say, for instance, two men decide to commence poultry-keeping with a pen of Buff Orpingtons, and say further that both procure their birds from the same source. One man wants to specialize in winter egg production, and during a period of ten or a dozen years he systematically selects his breeders with this end in view; he is quite unconcerned how the table qualities may be neglected; all he cares about is to increase the number and size of eggs. The second man, on the contrary, is anxious to improve their table characteristics, and he likewise for a similar period selects accordingly; he is indifferent to the fact that his stock may be degenerating as layers; all he cares about is to make the chickens good edible birds. At the end of ten or twelve years both men possess Buff Orpingtons, it is true, and anyone judging the qualities by rule, would imagine that both flocks combined the two essential features of table and laying, whereas, as a matter of fact, one flock would consist of admirable layers with poor table qualities, and the other of splendid marketing chickens with poor laying powers. While, therefore, the breed of a fowl denotes certain qualities, it cannot be taken as altogether conclusive.

There are several methods of classifying fowls, of varying value to the poultry-keeper, but there is none so useful to the utilitarian as that by means of their economic qualities, as this denotes at once for what purpose the birds are most valuable. Dividing the breeds in this manner we get four main classes, namely: 1 The general purpose; 2 the laying or non-sitting; 3 the table; and 4 the fancy. Of the other methods of classification perhaps the best is by the country of origin, as in this manner there is a certain amount of indication as to the breeds' economic value. Under this system we have two chief types—the Asiatic and the Mediterranean. The former of these are large, heavily feathered birds; they possess good quality flesh, and are fairly good winter layers, while they have large frames and heavy bone; the latter type, on the other hand, differs very considerably in shape, appearance and characteristics, being composed of small-bodied, active birds, carrying a large single comb, which are excellent layers and extremely poor on the table. The Asiatics produce, when hatched at the right time of the year, the bulk of their eggs during the winter, while the Mediterraneans are more spring and summer layers. The former are reliable sitters and mothers, while the latter rarely evince any desire to sit, and when they do, they are scarcely to be trusted, especially on valuable eggs. It is extremely interesting to note that the reason fowls of the Mediterranean type are non-sitters, is through the influence of the Egyptian egg ovens, in which, for centuries past, eggs have been artificially incubated. The hens having for generations been broken of their broodiness, the instinct of maternity has become suspended, which bears out one of the great laws of nature that the disuse of any function tends to its deterioration. Another method of classifying poultry is by means of colour of plumage, in which case we have white birds, black birds, buff birds, etc., but as this serves no useful purpose so far as the utility poultry-keeper is concerned, we may dismiss it without comment. Then again, fowls are sometimes classified according to the presence or absence of leg feathering, to the shape of the comb, and in many other ways; but none of these are of any practical service.

As already stated the most satisfactory method of classification is by means of the economic qualities, and this is the method by which we propose to class the leading varieties of domestic poultry. In the first place there are the general-purpose. The breeds coming under this heading are those that combine to a very large degree laying and table properties. They are better upon the table than the laying or non-sitting breeds, but do not produce as many eggs; they are better layers than the table varieties, but are not so suitable for marketing. They may be said to be good in both qualities, but to excel in neither. As a rule they are the most useful class of fowl for farmers to keep, and a thing certainly much in their favour is that they are such excellent winter layers. The number of eggs produced does not equal that of the non-sitting breeds, but the eggs are laid at the time of the year that eggs are scarce, and consequently dear. In determining a bird's value the actual number of eggs produced in a season is not so important a consideration as the time of year at which they are laid. It would pay better to have a hen that laid a hundred and twenty eggs during the winter months rather than one that laid say a hundred and eighty during the summer. The general-purpose fowls lay tinted-shelled eggs, and for some reason coloured eggs have always a readier sale than the white. It is purely a question of fancy, as a white one may be equally as rich as a tinted, but while this is true, it is a point worth taking into consideration. The breeds belonging to the general-purpose class are:—

PLYMOUTH ROCK. A breed of American introduction. A large-boned bird, with bright yellow legs, and an excellent layer. There are four varieties: Barred, White, Buff and Black.

WYANDOTTE. Also an American breed. Has a rose comb, is large in body and a first-class layer, though the eggs are a trifle small. Eight varieties: Silver, Golden, White, Buff, Buff Laced, Partridge, Black and Silver Pencilled.

ORPINGTON. A very popular breed, and deservedly so, especially the Buff. A large-bodied bird with white legs. The best all-round breed there is at the present time. A splendid winter layer. Four varieties: Buff, Black, White, and Spangled.

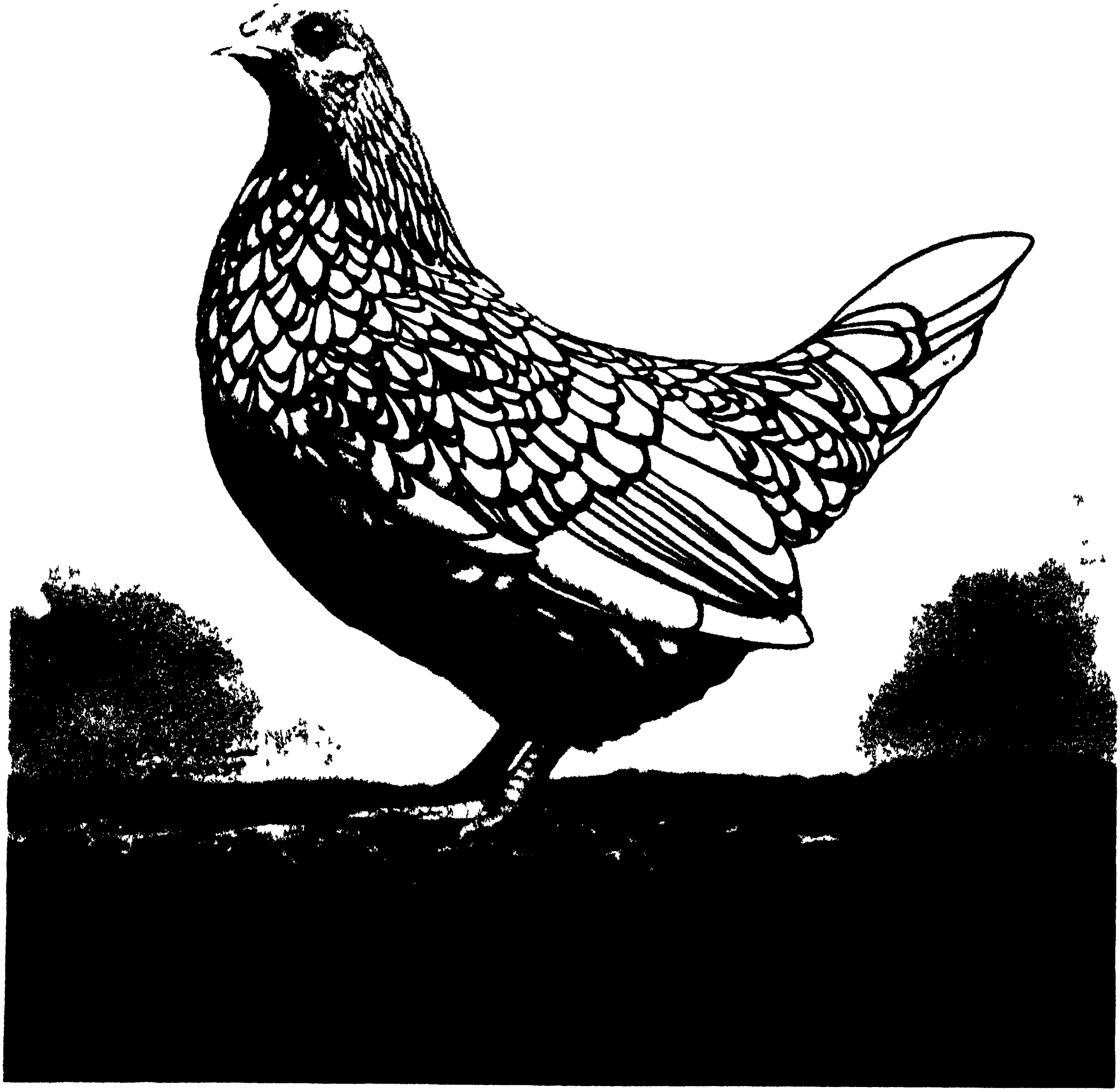
LANGSHAN. Two distinct types—the short dumpy and the long-legged exhibition. The former would be selected for utility purposes. Lays the deepest tinted egg of any breed. Three varieties: Black, White and Blue.

The laying or non-sitting breeds are those that lay the largest number of eggs, but they are comparatively poor winter layers. Their edible qualities are distinctly second-rate. The eggs produced by this class are invariably white-shelled and, generally speaking, are large in size, the majority weighing more than two ounces. As is suggested by their name, the hens rarely go broody, and if they do evince a desire to sit they can seldom be trusted upon valuable eggs. The chief laying or non-sitting breeds are as follows:—

MINORCA. Perhaps the best breed there is for egg production. Table qualities exceedingly poor. Two varieties: Black and White.

LEGHORN. Also an excellent egg producer. Rather hardier than the Minorca, being able to thrive well almost anywhere. Eight varieties: White, Brown, Pile,

PLATE No. 18



Silver Sebright Bantam Pullet.

(The property of Mr Harold Porritt Netherwood, Grange over-Sands)

Winner of 1st Crystal Palace 1st and Special Carlisle, 1908, etc.

Duckwing, Buff, Black, Cuckoo and Mottled.

HAMBURG. Produces an enormous number of eggs, but very small. If eggs were sold by weight, and not by number, one of the best breeds to keep. Five varieties: Black, Silver and Gold, Spangled and Silver and Gold Pencilled.

ANDALUSIAN. Produces the largest egg laid by any breed. One variety, the Blue.

ANCONA. Excellent layer, but eggs very poor in quality. Mottled plumage.

REDCAP. Resembles somewhat the Gold Spangled Hamburg. Carries an enormous comb, measuring sometimes 4 in. by 3 in., hence the name. Exceedingly hardy. Only one variety.

SCOTCH GREY. Very hardy, and thrives well anywhere. One of the best of the non-sitters for table purposes. Plumage black and white.

CAMPINE. The great egg-producing breed of Belgium. An excellent layer, and now thoroughly acclimatized to this country. Two varieties: Gold and Silver.

HOUDAN. A breed of French origin. Of the non-sitters the best upon the table. One variety only.

The varieties belonging to the table class are those that are particularly noted for the excellence of their flesh and the small amount of offal, that are large in size, deep in body, and that carry a large proportion of meat on the best parts, *i.e.*, the breast and wings. As a general rule the chickens are rapid growers, and lend themselves very readily to fattening. They are generally poor layers, though there are one or two notable exceptions. Few breeds of this class possess very robust constitutions or vigorous health, and only rarely can they be reared successfully upon clay land or in a very cold, exposed situation. In order to participate in the highest prices it is necessary for a table bird to have white flesh, as there is a strong prejudice in this country against flesh of any other description. This is merely a question of fashion, for there is no real reason why yellow flesh should not be equally as fine as white. The leading table breeds are as follows:—

DORKING. The best table breed there is. The birds are exceptionally massive and deep bodied, and carry a large amount of flesh upon the breast. There are five varieties: Dark, Silver Grey, White, Cuckoo and Red.

INDIAN GAME. Has an enormous breast development, and possesses flesh of a bright yellow, and is, therefore, of most use for crossing purposes. For producing table chickens to cross with a white-fleshed breed they are unrivalled. Only one variety.

SUSSEX. A breed that has lately come greatly to the fore. Excellent for table purposes and a fair layer. Three varieties: Red, Light and Speckled.

FAVEROLLES. Of the table breeds, the best egg producer. The flesh is of a very fine quality and texture. Three varieties: The Salmon, Black and Light. Carries feathers on the legs—somewhat unusual on a table bird.

CRÊVECŒUR. A French breed of a great size. One variety: Black.

LA BRESSE. Also a French breed, one to which considerable attention is being paid. Has a huge breast development. Four varieties: White, Black, Grey and Blue.

LA FLÈCHE. A French breed, quite black in plumage, and of a huge size. Only one variety.

The fancy class is the largest of all, as any breed, provided it is bred from the fancy standpoint, comes under this heading. Besides the ordinary varieties all the Bantams and freak breeds are included, making the class the largest of all. A fancier is he who breeds and selects his birds for their outward characteristics—their plumage, shape, comb, wattles, etc., and so long as these points are correct the number of eggs produced, or their edible qualities, count for nought.

We cannot mention the breeds that come under this heading, as every single variety more or less is included.

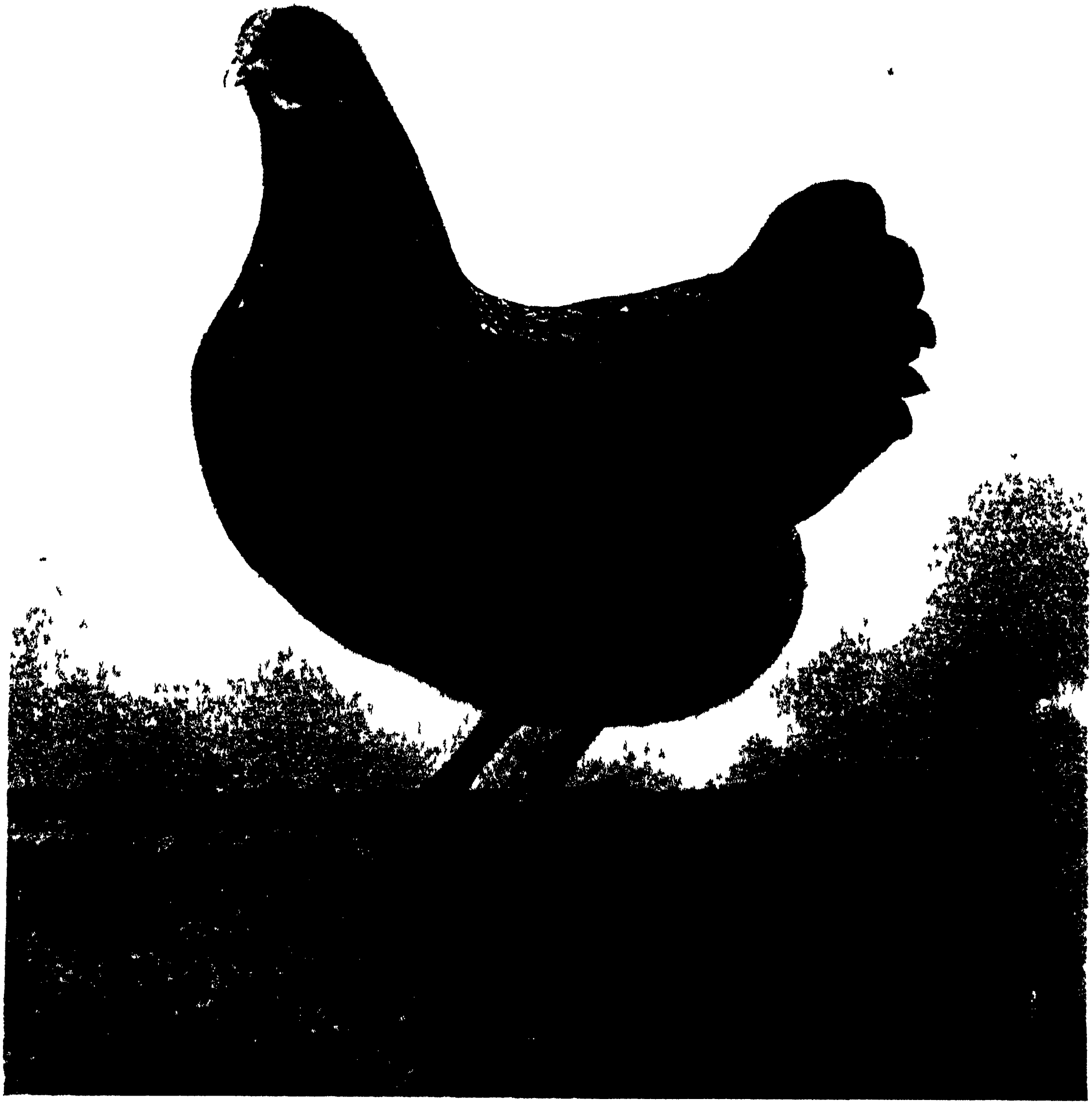
There are certain signs that denote to some extent for what purpose a breed is most suited, but these are so few and generally somewhat unreliable that it is necessary for us to have some further and more certain means of arriving at a correct idea. We have this in what is termed " lining " a fowl. A law of nature that assists us very materially in this respect is that the use of any organ or part of the body tends to its increase, the disuse to its decrease. This is a law of which we see evidences every day, and which applies to all living things. The more a man uses any part of his body the larger and stronger it becomes ; one who is constantly doing manual labour increases the size and strength of his limbs. On the other hand, the less a man uses any part of his body the weaker and smaller it becomes, and if this is continued for several generations the limbs or organs become appreciably less. It is by means of this law that the method termed " lining " denotes the utility qualities of a fowl ; it is because it is based on this invariable law that it always proves correct. An imaginary line is drawn through the centre of the body from the spot where the back and the neck meet to the legs. If the greater portion of the body is behind this line it denotes that the bird is a good layer, for it is here the eggs' organs are situated, while the table properties are comparatively poor. If the greater portion of the body is in front of this line, the bird is most valuable for table purposes, while if the fowl is equally balanced fore and aft it means that it is a general purpose. This method of lining, once it has been mastered, becomes extremely simple, and one becomes very expert in selecting the type best suited for one's particular requirements. It is possible from a yard full of hens to select the exact type that is wanted, and one is thus quite independent of any of the usual signs denoting certain characteristics. If the production of table chickens is aimed at, then hens or a male bird heavy in front should be chosen ; if eggs are wanted, hens well developed in the posterior region should be selected ; while if it is desired to combine the two branches of egg production and table chickens, an evenly balanced flock would be chosen.

BRESSE (*see* " French Breeds.")

BROILERS. Chickens marketed in America at about nine weeks old, and weighing about one-and-a-half pounds.

BRONCHITIS. Bronchitis is inflammation of the bronchi or bronchial tubes. When a bird inhales air it passes through the nostrils, where it becomes warmed, and where it leaves behind any particles of dust or other solid matter which may have been caught floating about. This solid matter is thus prevented from getting further down in the direction of the lungs, which, but for some such provision, would soon become blocked up, as a chimney-flue is gradually blocked up with solid particles from the smoke passing through. From the nostrils the air finds its way into the windpipe. Now there is an entrance to the windpipe also inside the mouth, at the back of the tongue, where a sort of muscle opening and shutting (called the glottis) is to be seen. If a bird's nostrils are closed up with a catarrhal discharge, so that the breath cannot pass that way, suffocation is obviated by breathing through this glottis opening instead ; but when a bird is obliged to breathe that way, its breath does not get warmed before it reaches the lungs, nor is it so likely to be purified of the solid particles it may contain. This, then, is the true origin of bronchitis. The bronchial tubes become irritated and congested by these solid particles—inflammation is set up—catarrh begins, and there is the bronchitis.

PLATE No. 19



Partridge Wyandotte Bantam Hen

(Bred and exhibited by Mr. J. F. Entwisle, The Firs, Calder Grove, near Wakefield.)

Winner of 1st and Variety Bantam Club's Silver Rose Bowl, Liverpool; 1st Norwich; 1st Crystal Palace; 1st Leeds; 1st Otley; 1st Harrogate; and 1st Penistone; never been beaten.

at once. The treatment for bronchitis is practically the same as for pneumonia (which see).

BROOD. Chickens under the same hen.

BROODERS AND BROODER HOUSES (*see* " Rearing, artificial.")

BROODING (*see* " Rearing, artificial.")

BROODINESS. The peculiar heavy state of a hen wishing to sit after laying a batch of eggs.

BROODY HENS, CURE OF. Broodiness is merely the natural instinct and desire of the hen to reproduce her species, and it occurs when a hen has exhausted her supply of eggs, and has no more ova ripe for expulsion. It is a sign, for the time being, that she has ceased, or is about to cease, laying. Some very curious ideas exist as to how a hen should be cured of her broodiness. In remote districts poultry-keepers still pin their faith to the old-fashioned method of dipping in water, which is not only absurd, but cruel. By far the best way is to confine the hen in a coop with a slatted bottom—that is, a bottom composed of laths nailed two inches apart—the coop being raised clear of the ground by two bricks at each end. In such a coop it is impossible for the hen to sit—she is obliged to roost continually—and the discomfort of the situation will soon break her up. Another way is to make a box about twelve inches square, out of laths, nailing them two inches apart. Drive a hook in the centre of the top of the box, and, having placed the hen inside, suspend the box from the roof by means of a cord. Every time the hen moves she will be jerked to and fro, and after a spell of this kind of exercise she will be very glad to get out and resume laying. If, at the first symptoms of broodiness, a hen is removed from her accustomed surroundings and placed in a roomy coop, where there is plenty of light, in close proximity to other fowls, and fed on food of a stimulating nature, so as to induce activity of the egg organs, she will often lose her desire to sit in a couple of days, and resume laying in a week or so.

BUCKWHEAT (*see* " Feeding stuffs.")

BUMBLE-FOOT. Bumble-foot is a common disease among poultry. It is a swollen condition underneath the foot—the ball of the foot, in fact, gradually hardens, and forms a substance, hard at first, but gradually becoming full of pus and very painful. The way in which the complaint is brought on is simple. A bird in an unhealthy condition, so far as its blood is concerned, may scratch the ball of its foot against some little notch on a perch, or tread on a piece of glass or metal, thereby causing injury to the ball of the foot, or it may even damage itself by fighting, and then inflammation is set up and the unhealthy condition of the blood generally makes itself felt in the tenderest part, *i.e.*, the foot. The way to cure a case of bumble-foot is to poultice the place with linseed or bread, in order to soften the lump, then cut it open and remove the core, after which syringe it with carbolic lotion, and apply a little simple ointment to heal it. The foot will have to be bandaged for several days, and the bird should be put into a small pen where it will be obliged to squat down on the floor to rest. Bumble-foot is really one of the forms of tuberculosis—scrofula—and it is most common amongst highly-bred exhibition birds, the reason for this probably being that such birds have been produced as a result of close in-breeding, which tends to lower the vitality and to predispose the offspring to tubercular and scrofulous disease.

BURNS AND SCALDS (*see* " Accidents.")

CALL DUCKS (*see* "Ducks, ornamental.")

CAMBRIDGE BRONZE (*see* "Turkeys.")

CAMPINE. The Campine has been known in Belgium for 400 years at least—ever since the time of the Emperor Charles V. On the rich loamy clay soil of Flanders the breed is large, and is known as the Brackel. On the dry arid soil of "la Campine" the bird is smaller, but in origin and in all characteristics they are one and the same. To their long pedigree, and the length of time during which selective mating has been possible, the remarkable prolificacy of the females is due. Such a breed must be more stable than a lately produced one. The bird was introduced into England by the Huguenots, and was known by various names. The Bolton Greys were undoubtedly Campines originally. In 1899, however, they were re-discovered and several birds—both Campines and Brackels—were imported. As then introduced the male birds had white neck hackles—white top and black tail with barred breast. The females had white neck hackles, and were barred all over the body.

Silver Campine Cockerel.

Property of Dr Dunkin, 68, Studley Road, Clapham, S W

Winner of 1st Hayward's Heath, 2nd Manchester, Special and 1st Grand United Metropolitan

To produce good exhibition specimens of such birds, double mating would have been necessary—so the club, formed to further the interest of the Campine, determined to avoid this by drawing up a standard which made it possible to produce show cockerels and pullets from one pen. This decision led to considerable controversy and to a diminution of the great popularity which the breed had immediately acquired. The beautiful show specimens placed in the pens to-day should convince all of the wisdom of the step taken and lead to a permanent revival in their favour.

The Campine hen is a non-sitter and lays a large white egg (2 oz. and over). The pullets lay when from five to six months old. Like all non-sitters, they do not make a large table fowl. There is, however, an unusual amount of breast meat and the proportion of meat to offal is high. As regards climate the breed is very adaptable. Provided they have plenty of air in their roosting quarters, they will stand rain, wind or cold. Very favourable reports come from Canada, where they do well when the mercury is several degrees below freezing point. They also do well in confinement, if not over-fed. On a free range they will find most of their food. The birds are not wild, though they are good flyers, and if frightened will easily clear a 6 ft. fence. They breed true, and the cockerels are very useful for crossing, as they improve the breast meat and the laying qualities of their progeny. The eggs are very fertile and hatch well. The chickens are strong and active. The coops should not be placed near long grass, however, as the chickens wander far and wide, and may easily get thoroughly wet, which naturally will lead to complications. The young birds feather quickly, and, with the exception of the head, are generally completely clothed in a fortnight. The young cockerels are precocious, and have been known to crow at five weeks old.

CANADA GOOSE (*see* "Geese.")

CANDLING. A method of determining the character of the contents of an egg (*see* "Eggs, testing.")

CANKER (*see* "Roup.")

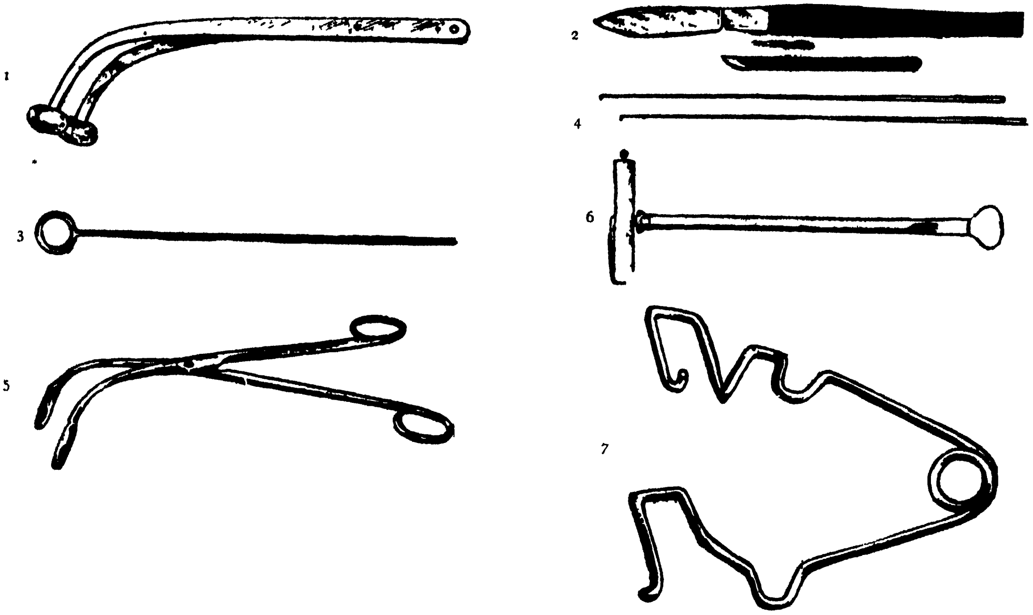
CAPON. A cockerel in which the reproductive powers have been destroyed. (*see* "Caponising.")

CAPONIZING. To caponize means to castrate; to remove the testicles from a fowl. A fowl so unsexed is called a "capon" The operation tames the disposition and permits the fowl to make growth without the flesh becoming tough or stringy, therefore, the flesh of the capon is of superior grain and flavour to that of the ordinary cockerel and more tender. But perhaps the great advantage of caponizing to the poultry farmer is that it provides a profitable means of disposing of late-hatched cockerels. The operation is not at all difficult—first operations being often successful though the losses are, of course, larger than those of experienced operators. The danger lies not so much in the mortality during the actual operation, as in subsequent developments from faulty work. The beginner should take his time with his first experiment, which should be in the form of an operation on a dead bird. He should make himself thoroughly familiar with the operation on this first fowl, and proceed in the same way thereafter with live ones. If, at any time, he thinks that he has fatally injured a bird he should kill it at once, and it will be as fit for the table as any other fowl. Many persons who realize the advantages of caponizing are deterred from practising the operation through the fear of inflicting pain. But the practice is far from being cruel, and is not extremely painful. It is seldom indeed that the fowl gives voice to any outcry during the operation. The most pain seems to be caused by the incision, and after that the bird seldom shows any evidence of distress whatever. Capon-

View of Organs lying along the Back.

1 Rectum 2 Trachea 3 Bronchus 4 Œsophagus 5 Lung 6 Suprarenal Capsules 7 Testicle 8 Cut for Caponizing 9 Rib 10 Kidney 11 Nerves and Blood Vessels which pass through to supply the Legs 12 Blood Vessels along the Spine 13 Kidney 14 Ureter 15 Vas Deferens 16 Bursa of Fabricius 17 Verge of Anus

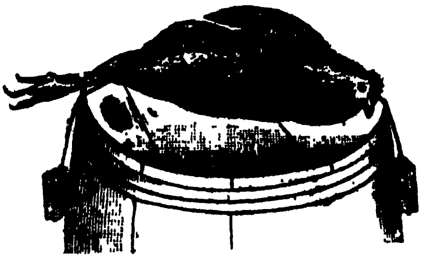
izing instruments are manufactured by several firms, but the different sets do not vary much either in style or price. All sets include the following: A knife for making the incision, a spreader for holding the ribs apart and the incision open, a hook for tearing away the inside membrane (the striffin), a probe to push aside the entrails should they get in the way, an instrument for catching and removing the testicles, and a pair of forceps. The knife is merely a piece of well-tempered steel, capable of being brought to a very sharp edge. The spring spreader is a steel spring so constructed that when inserted in the incision it will keep the incision open so that the operator may see what he is doing. The small, steel hook is for the purpose of tearing away the thin membrane covering the bowels that is visible after the incision. The instrument for removing the testicles varies in different sets; perhaps the most used is the canula. This is a hollow steel tube arranged for the insertion of a fine wire, which is so placed that its ends project from the large end of the tube, the middle of the wire forming a loop at the other end. The end conveying the loop is thrust into the incision, and the loop is thrown round the testicle. The wire loop is then tightened by drawing on the ends of the wire protruding from the the free end of tube, and the testicle is removed by twisting the tube. Some sets of instruments, instead of having the canula, are supplied with the notched scoop, an instrument with a small, slotted, spoon-like blade. The edges of the slot are sharpened and the spoon is slipped under the testicle in such a way that the slot catches the cord to which the testicle is attached and cuts it, leaving the testicle in the spoon. It is also necessary to have a basin containing a two per cent. solution of carbolic acid in water for antiseptic purposes, and sponges to absorb any blood that may be spilt. A table is



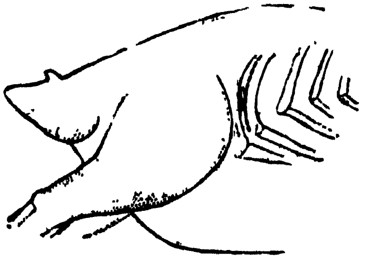
Instruments for Caponizing.

1 Curved Spoon Forceps 2 Knives 3 Ring Probe 4 Sharp Pointed Hooks 5 Curved Catch Forceps. 6 The Canula 7 Spreader for holding the Incision apart

constructed for operating purposes on the following lines: It should be somewhat higher than the waist, so as not to require much stooping. The top should be about two feet in diameter and so fastened to the stand that it may be tilted, making it possible to get sunlight in any position. The top should be fitted with holes through which the cords holding weights of about a pound are passed. The cords pass over the fowl's legs and wings to hold them down and prevent any kicking or flapping while the operation is in progress. The operation should be performed just before the combs of the cockerels begin to "shoot." At this period the birds are about three months old and weigh from one and a half to two pounds. Birds over five months old, or weighing more than three pounds, should never be caponized, as the operation would so often result fatally as to prove unprofitable. The cockerels intended to be caponized should be caught and confined without food for at least twenty-four hours before the operation. This empties the bowels and causes them to be much less in the way. If the day set proves dark or cloudy operations should be postponed. Bright sunlight is absolutely essential to enable the operator to see the interior of the fowl, and the danger of germ infection is much less on a bright day than on a dark cloudy one. Supposing the day to be bright and clear and the instruments and table in readiness, the fowl to be operated upon should be placed on the operating table on its side. One cord is passed over the wings and the other over the legs. The last two ribs should be located by feeling for them with the fingers and will be found pretty well up towards the back. Any feathers that are in the way should be pulled out and the surrounding ones wetted and plastered on to each side. The loose skin may now be pulled on one side away from the point where the incision is to be made. The next step is to take the knife for the initial incision, holding the blade upright, and inserting the point between the ribs and through the flesh, and then pulling it down, keeping it between the ribs all the time, until an incision is made about one inch long. Care must be taken not to thrust the knife in far enough to endanger the bowels. The operator should next take the spring spreaders, compress them, insert them into the cut and release them, making sure that they are firmly fixed and will not fly out at a critical moment. A thin filmy membrane will be seen covering the intestines. This must be torn away with the hook. The bowels must be carefully avoided in the meantime, as an injury to them would prove fatal. Now, if the incision has been made in the right place, the testicles will be almost directly under the opening, being fastened up close under the back.



Bird in position for operating.



Point of Incision as indicated by dotted lines

On the position of the incision depends the success of the operation, as when it is in the right place the testicles can be readily found, but if too low down or too far forward it is very difficult, if not impossible, to locate them, and proportionately harder to remove them. When the testicles are seen the operator should take his canula, and adjust the wire loop around the testicle on to the attaching cord. He should then tighten the loop by drawing on the ends of the wire protruding from the free end of the tube. Sometimes the cord can be severed by merely pulling on the wire, but this is not often. It is not advisable to try to break the cord by pulling with the canula but if twisted slowly from side to side, after several motions it will come loose and may be removed. If it should fall from the canula when severed it can be removed with the forceps. If the caponizing set contains the slotted scoop instead of the canula, the method of procedure is just the same, except in the removal of the testicles. The testicles are slipped through the scoop so that the cord is caught in the slot. If the edges of the slot are well sharpened the cord will be cut, leaving the testicle to be removed with the scoop. But if they are blunt it will require some twisting of the scoop before the cord parts. After having removed one testicle as above it is only necessary to turn the fowl and repeat the operation on the other side. Many operators, however, remove both testicles from one side, removing the lower one first. This is a slightly more difficult operation, but as it requires only one incision, it is easier on the fowl, and with experienced operators is a more rapid process. The beginner had better content himself with making two incisions to the operation, and if during any operation he should find a specimen in which both testicles are in full view from one side he may try the experiment of removing both from one side. If at any time during the operation blood is shed, it should be absorbed with pieces of sponge, first wetted in the carbolized water and then squeezed dry. A small amount of blood spilled in the abdominal cavity is not liable to cause any subsequent trouble. After the testicles have been removed care must be taken that there are no foreign particles in the abdominal cavity. The spreader may then be removed and the skin permitted to slip over the incision, which it will do at once if it has been properly pulled aside before the operation. The capon should be placed in a quiet spot for a fortnight, and allowed to partake of food and water immediately. It will eat greedily from the long fast that preceded the operation, In a few days it may be released and should be treated much like any other growing chicken.

CAPSULE. A part of an incubator regulator (*see* "Incubators.")

CAROLINA DUCKS (*see* "Ducks, ornamental.")

CARRIAGE. The way in which a bird holds itself in walking, and its general style and appearance.

CARUNCULATED. When the head and neck are covered with a fleshy, loose skin, as in the turkey; also seen on the face of the black Spanish.

CASTILIAN (*see* "Foreign breeds, lesser known.")

CATARRH (*see* "Roup.")

CATS (*see* "Enemies.")

CAUMONT (*see* "French Breeds.")

CAYUGA (*see* "Ducks.")

CEREOPSIS (*see* "Geese.")

CHALAZÆ. Cords of dense albumen within the white of an egg (*see* "Eggs, structure.")

CHICK. A very young chicken.

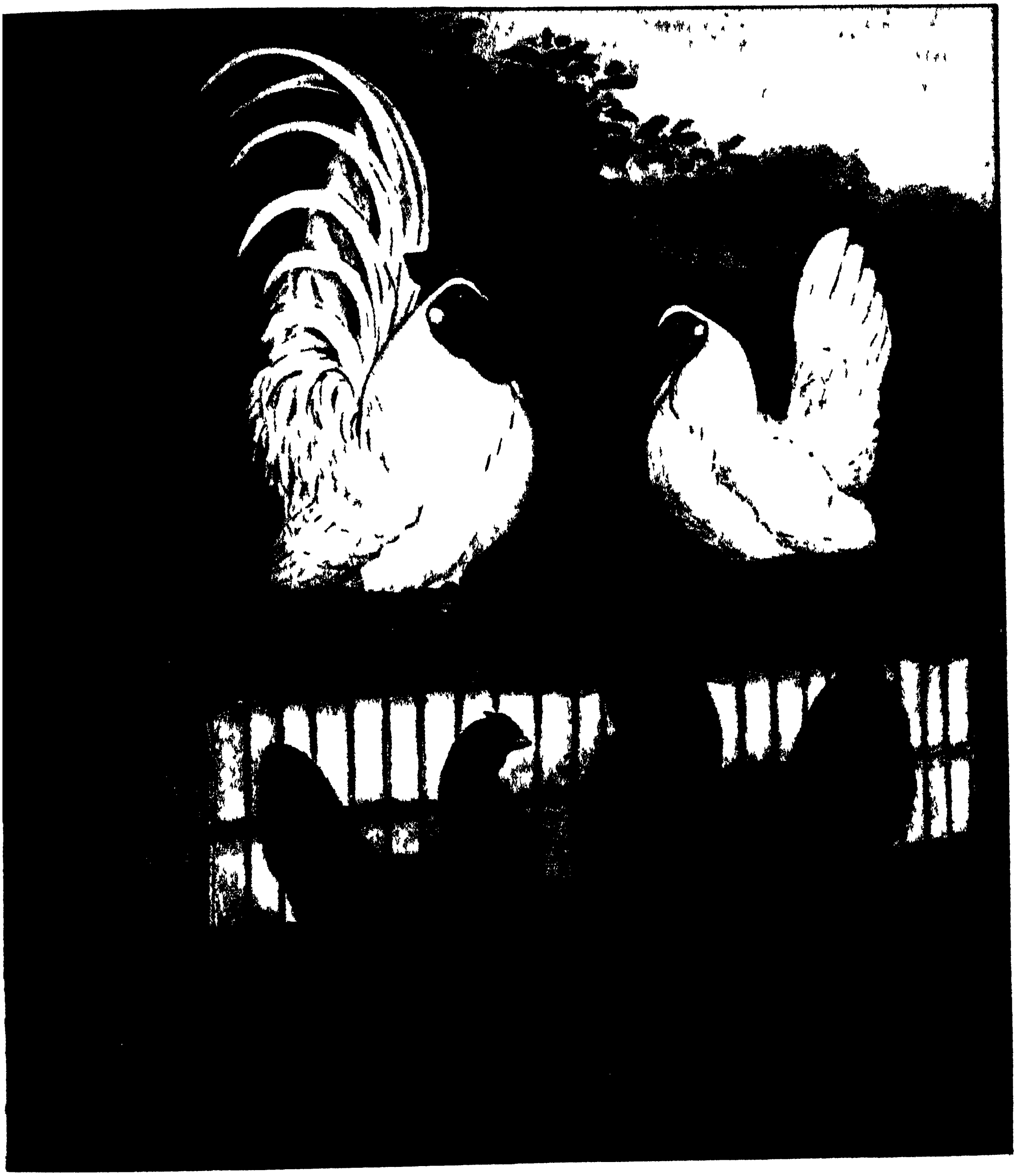
CHICKEN. Applied to pullets and cockerels under a year old.

CHICKEN-POX. Poultry do not, for some inexplicable reason, suffer so much from "chicken-pox" (as it is

White Japanese, and

Exhibited by [illegible]

PLATE No. 20



White Japanese, and Golden Sebright Bantams.

Bred and exhibited by Her Majesty Queen Alexandra and reproduced with Her Majesty's gracious permission expressly for this work

called) in England as they appear to do in America and South Africa, where the disease is recognised as one of the most virulent and troublesome of all the complaints against which the poultry farmer has to do battle. The disease, as its name implies, consists of a sort of pustular eruption on the face, head, comb and wattles. These eruptions vary in their characteristics somewhat; in some cases they seem dry and warty, while in others they are moist and disposed to be confluent. Turkeys are liable to be affected with the complaint, and when they get it the scabs look almost like Indian corn, and an outbreak is naturally very mischievous. The disease is undoubtedly of scrofulous origin and needs to be treated with internal remedies as well as by external applications. Of all internal medicines there is nothing to beat Epsom salts, which clears the system of a fowl more thoroughly and speedily than anything else. Let all the poultry, therefore (both those affected and those which have not yet contracted the disease), be liberally dosed with this cheap and simple physic, and by way of external treatment, first remove the scabs and then bathe the raw places with weak coal-tar lotion, and afterwards smear them with carbolized vaseline. It is best to wait until the scabs are dry or nearly so before doing this, and in many cases it will help matters to dust a little powdered fuller's earth on each, by way of an absorbent. In the confluent cases there is nothing better than this fuller's earth mixed with about 25 per cent of powdered boracic acid. Apply this freely several times a day, and then use the coal-tar lotion and the carbolized vaseline according to discretion, if necessary. In some cases the dry powder treatment alone will suffice; but each case must be treated on its own merits. With regard to preventive measures, it is important to see that the disease does not spread, and to this end it is desirable to isolate all affected birds as soon as they develop the complaint. The best method of isolation is to set up some wire pens in an out-building and put the patients into hospital there as fast as they are taken ill. Wire pens are always the best for hospital purposes,

"*The Standard, U S A*"

Illustration made from Actual Photographs of Hens afflicted with Chicken Pox.

Left A hen with five Chicken Pox warts -four on her comb, and one on her face

Centre · A hen with a wart over her eye, and the moist or "vesicular" variety of Pox in her eye It is common for a bird to have both the dry and moist Pox at the same time

Right The same hen shown in the left-hand illustration, but the crusts of the warts have been removed for treatment because they can be treated with scalding water afterwards, in order to destroy the disease-germs lurking about them. At the same time, it is also well, if a large flock of poultry are running together, to split them up into colonies and distribute these colonies over the farm (if land be available), so as far as possible to lessen the risks of contagion ; also have a general clearance out of roosting houses, nest boxes, scratching litter, and every other place or material likely to harbour any disease, and limewash every building or pen used by the poultry. These disinfecting measures (amongst which might very well be included the sulphur fumigation of all houses, etc., capable of being shut up closely) and the medicinal treatment recommended above, should suffice to stamp out any ordinary outbreak in a comparatively short space of time.

CHICKENS, FOR MARKET (*see* " Marketing.")

CHICKENS, MANAGEMENT OF (*see* " Rearing.")

CHINESE GEESE (*see* " Geese.")

CHOLERA. Cholera is an epidemic form of bowel disease, sometimes known as " chicken cholera," and is not always easily distinguishable from enteritis (which see). It is almost incurable in adult poultry ; in chickens it is quite fatal. It is characterised by the presence of blood in the excretions, which are, indeed, mostly composed of blood and jelly. This blood shows that the lining of the intestines is likely to be perforated, and that is extremely dangerous. Life or death depends upon the existence or not of this perforation, and upon the means taken to grapple with the complaint when it is discovered. Cholera is due no doubt in the first instance to a bad drain or sewage-contaminated water-course, to which the birds have access. But when once started it spreads with alarming rapidity. Gamekeepers know to their cost how fatal it is amongst young pheasants and partridges. The first thing to be done to check it is to spread out the birds, putting them on to fresh land in small lots kept strictly apart from each other. The existing water supply should be stopped, and the birds be made to drink water to which a small quantity of steel or iron solution has been added. This will act as a tonic and will tend to prevent further spreading through the medium of the water fountain. The perforation referred to may be rendered less likely by giving thick barley water occasionally, especially if the birds show signs of great thirst--a sign of fever and one characteristic of cholera, as of all epidemic diseases. Another important precaution is to find any birds that show signs of developing the complaint, and giving them liberal doses of sweet olive oil to soothe the intestines. It is hardly necessary to add that the ground on which birds suffering from cholera have been kept should be stringently purified, by lime and salt being first spread over it and then dug in. For other details of treatment follow directions given under " Enteritis."

CLASSIFICATION (*see* " Breeds.")

CLEANING (*see* " Housing.")

CLUBS, SPECIALIST. The regulation of the poultry fancy rests almost entirely with the specialist clubs. At the head of these is the Poultry Club, founded in 1877, with the following objects : (1) the promotion of the breeding and exhibition of poultry ; (2) the suppression of fraud and dishonourable conduct therein, and (3) the advancement and protection of the interests of poultry breeders and exhibitors. The Poultry Club has upwards of 1,000 members, with a bank balance of over £300, and is governed by a Council consisting of president, past president, twelve vice-presidents, an hon. treasurer, hon. solicitor and hon.

secretary, with delegates from the county branches. Each county having twenty-five or more members is entitled to form a county branch for the transaction of local business and to send a delegate to the Council. The subscription to the club is 5/- per annum, due on October 1st, and in addition to the ordinary members, a number of fanciers' societies and specialist clubs are affiliated, paying a fee of 5/- per annum, in return for which they are licensed to hold their shows under club rules, and are granted medals or other special prizes for competition. At all shows held under Poultry Club rules, special precautions are taken in the interests of exhibitors, and any irregularities are reported to the club. A Council Meeting is held every month in London, when matters of general interest are dealt with, and protests and reported cases of alleged dishonesty are inquired into. The Council inflicts the penalty of inhibition from exhibiting at shows under club rules (for life or for any period, according to the nature of the offence) upon persons proved guilty of dishonourable practices. Unfortunately, however, only a small proportion of shows are held under Poultry Club rules, and the club has no control whatever over societies and shows which are not affiliated. Although nearly all the leading breeders and exhibitors are members of the club and support its good work, it has, up to the present, been found impossible to influence the entire fancy, although a vast amount of good work has been done by the club since its formation.

The specialist clubs have been formed to promote the interests of certain breeds, or groups of breeds. Whenever a variety attains any degree of popularity, its fanciers set about forming a club, and so we had, early in 1909, something like ninety specialist clubs for poultry in the United Kingdom, with memberships ranging from 300 down to 20. These clubs comprise the breeders of the particular varieties for which they cater, and their officers generally consist of a president, several vice-presidents, a committee, hon. secretary and treasurer, and a number of club judges, who are selected by the members to judges at shows supported by the clubs. Although the Poultry Club publishes a volume containing what are nominally styled the Poultry Club standards for the various breeds, the drawing up and revision of these standards rests entirely with the specialist clubs, and when a club is formed for a new variety, part of its first business is to draw up a standard describing minutely the characteristics of the variety, with a scale of points for judging.

The value of a specialist club in promoting the interests of a breed cannot be lightly estimated. There are some clubs that do much more good than others, according to the enterprise and ability of the hon. secretary, but taking for an example one of the modern clubs, catering for a popular variety, with a membership roll of from 100 to 200 members, we find that a good proportion of the clubs' funds are devoted to the provision of prizes for members. In the early days of a new variety, it is necessary for a club to guarantee classes at various shows, the committees of which are unwilling to run the risk of losing money by providing classification for little-known breeds. But when the variety becomes popular, and it is seen that classes draw entries readily, show committees have no hesitation in providing separate classification, and the specialist clubs lend thei assistance by giving special prizes, such as medals, plate, or cash, for the best bird shown by a member of the club, or else fourth or extra prizes, to stimulate competition. Then the more modern clubs give encouragement to amateurs and novices by providing special prizes for this class of member. In this way, many of the popular clubs lend their assistance to fifty or sixty shows in a year, and thus distribute premiums among the members.

Nearly every club possesses a number of challenge cups or trophies, which are competed for every year at a club show, generally held in connection with some popular event, when extended classification is provided, and in many cases, amateurs and novices are catered for with special classes. Then again, a great many of the clubs publish Year Books, some of which are well illustrated volumes, containing a great deal of interesting and valuable information to breeders of that particular variety. These Year Books are generally circulated freely, and attract a great many new members to the clubs. Among other benefits derived by members of these clubs, it may be mentioned that membership brings fanciers more in touch with one another, whilst beginners are able to obtain advice and assistance from more experienced members.

Appended is a list of Specialist Clubs :—

—— **FOWLS.** Ancona (United); Andalusian, Brahma, Campine, Cochin, Courtes-Pattes, Crêve Cœurs, Dark Dorking, Silver Grey Dorking, Faverolles, Indian Game, Modern Game and Game Bantam, Old English Game, Old English Game Fowl, United Game, Welsh Modern Game and Modern Game Bantam, Welsh United Game, Scottish Hamburgh, Southern Hamburgh, Houdan and French Breeds, La Flêche, Lakenfelder, Langshan (Society); Blue Langshan, Croad Langshan, Black Leghorn, Brown Leghorn, Buff Leghorn, Scottish Leghorn, Welsh Leghorn, Leghorn, Plymouth Rock and Andalusian, Malay (United); British Minorca, London Minorca, Scottish Minorca, Welsh Minorca, Black Orpington, Buff Orpington, Variety Orpington, White Orpington, Buff Plymouth Rock and Plymouth Rock (Society); Redcap, Rosecomb Blue, Scots Grey, Silkie, Sussex, Black Wyandotte, Blue-Laced Wyandotte, Columbian Wyandotte, Partridge Wyandotte, Scotch Wyandotte, Silver-Pencilled Wyandotte, United Wyandotte and White Wyandotte, Yokohama.

—— **BANTAMS.** Brahma, Brown Red and Birchin, Indian Game, Modern Game, Modern Pile Game, Old English Game, Indian Game, Malay, Pekin Seabright (Variety).

—— **WATERFOWL.** Indian Runner Duck and Buff Orpington. The Aylesbury, Cayuga, Pekin and Rouen Ducks, and Emden and Toulouse Geese are represented by the Waterfowl Club.

The clubs subscriptions to these specialist clubs vary from one guinea to 2/6. The great majority of the popular clubs, however, charge 5/- per annum, and as the officials invariably render their services honorarily, the whole of the funds are devoted to promoting the interests of the breed and its patrons. In some cases, it will be seen, there are more than one club catering for a variety. It will also be noticed that some embrace a group of breeds, whilst others devote their attention to the individual members of that group. In any case, the specialist club movement, a comparatively modern development, has done much to extend the influence and regulate the affairs of the poultry fancy.

CLUTCH. The sitting of eggs under a hen; a brood of chickens is also so termed.

COALEY FAWN. (see "Ducks, coaley fawn.")

COCHIN. This variety of fowl has rightly been termed the cart horse of the poultry fancy. Its enormous size, together with the heavy feathering, gives the bird a massive appearance seen in no other breed, not even in the Brahma. The bird, when compared with the earliest arrivals to this country, has made rapid strides in every respect from the exhibitors' standpoint, yet in so doing some of the utility features have been lost. However, to-day there are many breeders who assert that for winter egg production the

PLATE No. 21

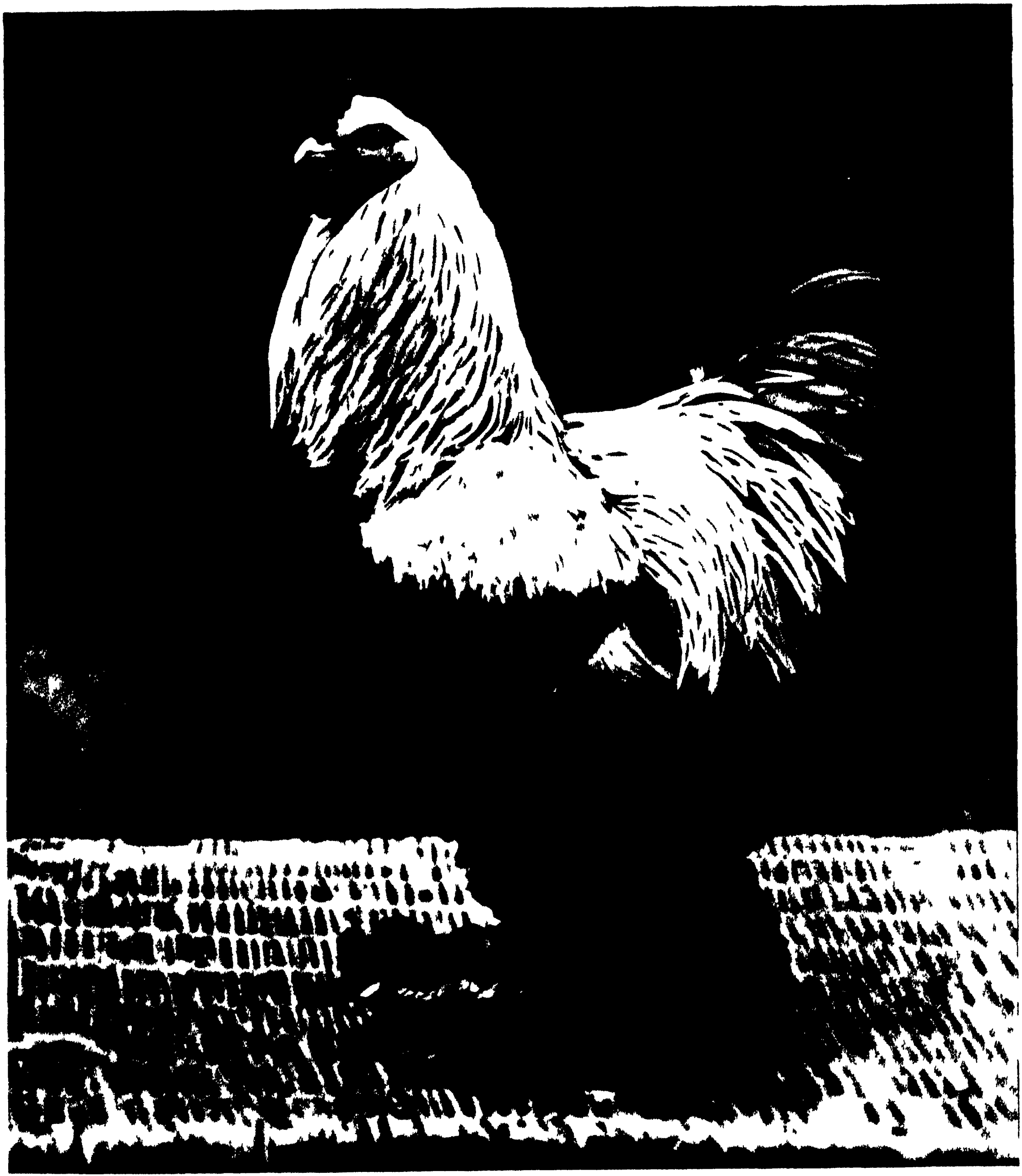


Photo by R. H. Lord

Dark Brahma Cock.

(Bred and exhibited by Mr. James [illegible], Underbank, Thornton, [illegible].)

Winner of 1st and Club Special, Manchester, 1908, etc., etc.

Partridge variety will lay as many eggs as some of the more modern and much lauded varieties. The character of the breed is the same all the way through, no matter what the colour, and the three self colours are now very uniform in size, bulk and quantity of feather. A typical Cochin must have great width of breast and the fluff on either side of the thighs stand right out like two large balls, while the cushion should be like a third ball lodged on the two lower ones With the hen these three balls are easily distinguished if looked at from the back, and the more length of feather, together with the fluff down the stem of the feather, the better, as this gives the appearance of more bulk, although not materially adding to the size of the body The bird, when feeding, should look as if it was going to turn a somersault, the head down on the ground, the weight behind appears as if it must overbalance the body though really, this is only fluff and feather In striking contrast to the Game Fowl, the feather of the Cochin will only show a web on the tip or outside portion, while all the other part, that is, down the stem, must be fluff of a woolly nature, and it is this that gives massiveness to the outward appearance. In both sexes the breast should be very full and round, in fact, the hens should be almost square in front, and when feeding the breast will almost touch the ground This is more easy to breed in the hens than the cocks, which have a tendency to go flat, a defect referred to as flat-chested Some strains of birds show this more than others, and while the Buffs vary in this respect, the colour most even through both sexes is undoubtedly the Blacks In addition to the heavy thigh feathering there must be a quantity down between the legs, so that when the bird is facing one, there is no space underneath the bird Spare feathering here is spoken of as seeing "daylight between the legs," which must not be confounded with "too much daylight underneath," which has reference to the bird being too high up on leg. The feather must extend right from the fluff all the way down the leg and right up to the end of the middle toe It is not an uncommon thing to get six inches of feather standing out from the feet, but then great care must be used in management so that this does not get broken. This is a great fault for the exhibition pen, as is also a deficiency of toe feathering A bird may be excellent in other respects, but fail completely in the feet, hence it is a point that must be made much of by the breeder and the exhibitor Another fault in the Cochin is the vulture hock, as seen sometimes in the Brahmas The feathers stand out hard and stiff from the hock and all in a bunch, a failing quite out of character with the variety Some birds that do not fail in this respect have the fluff and foot feathering in good order, but show a break in the leg feathering which takes away the character of the breed and is stiffly penalised in the show pen Thanks to the energy of a few well-known breeders the four universal

Partridge Cochin Hen.

colours are kept well to the front, and can be seen at all the leading exhibitions. These are the Buff, Partridge, Black and White, though on one or two occasions a Cuckoo has been put on the bench. This colour, resembling the Barred Rock, did not meet with favour and has not been seen for many years. Of the other colours the oldest is the Buff. Birds of this shade were first imported into this country about 1843, but if these could be seen now would not be recoginsed as belonging to the same family as the present-day Cochins. However, these were secured by Queen Victoria, and thus the breed received royal support. More stock was imported again in 1847, and from this the present stock was originated. The first birds put in the show pen were at Birmingham, in 1850, and though very crude in form, created quite a sensation, as nothing of the kind had been seen before. After this the breed leaped into popularity, and became one of the favourites among the exhibiting fancy. In the year 1857 or 1858 a stock of these birds were sold under the hammer, when 120 birds realised £609 -a huge total considering the time and the position of the fancy. Although the Buff should have been a self-colour, many of the birds had black tails, and hardly any feathering on the legs and feet. The shade of colour is not so important as having one uniform all the way through and as sound as possible. In the Partridge the cocks are difficult to produce with a sound black breast and fluff and the foot feather free from any white. The neck hackle and saddle hackle should be clearly striped black with a rich orange lacing, both these parts to match, although the neck has a tendency to go lighter in colour. With the hens, the primary feature is a long fine pencilling on a rich chestnut ground colour, though, of course, the general character is the same as in the other colours. The Black and White almost describe themselves, though with the former it should be a rich beetle green shade, with as much lustre as can be got without destroying the colour. Purity of colour is the great desideratum in the White, and while this can be bred fairly easily in the hens it is more difficult in the cocks. These run cream on the back and saddle, and though the nature of the feather assists this tendency, they can be produced pure all through. A neat head and close, compact tail completes the bird, which stands out as the most majestic specimen of the race. (*See Plates Nos.* 23, 24, and 25).

COCKEREL. A young cock.

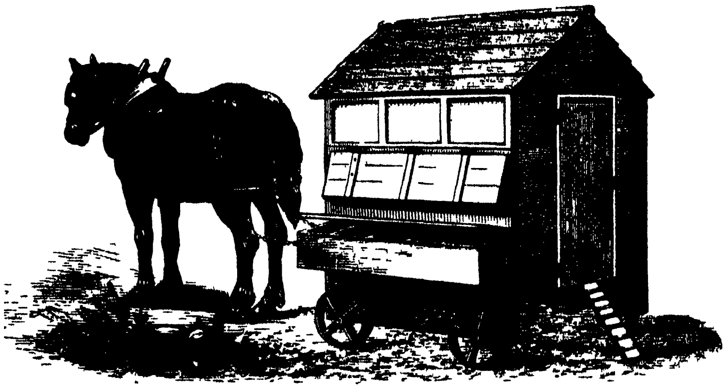
COLD (*see* "Roup.")

COLD STORAGE. The importation of frozen poultry from the Colonies caused attention to be paid to cold storage in Great Britain as a means of regulating the market supply. The birds, usually plucked and drawn, are packed lightly in crates and then placed in cool chambers. It is not advisable to have the temperature lower than 20 degrees F., otherwise the flesh suffers, the birds having a flaccid appearance and the flesh being dry. Birds should not be kept in cold store for more than eight or nine weeks, and when taken out they should be placed in an intermediate chamber and the temperature raised gradually. The whole question of cold storage is under discussion. It is certain that unless great care is observed deterioration does take place; birds removed from cold chambers will not keep long. This has been attributed to the action of bacteria, which are supposed to make their way from the empty abdominal cavity to the muscles, and there set up the early stages of putrefaction. For this reason it has been suggested that birds intended for cold storage should not be drawn. But this necessitates harder freezing, and other inconveniences supervene. If poultry is to be kept for any length of time, they should be stored perfectly clean and as soon after killing as possible. The ammonia process is the usual and safest method of refrigerating. The ammonia is closed hermetically in a system of pipes and chambers. It is volatilised by the application of heat in one chamber, and expanding, enters the cold chamber, where it causes a fall of temperature, absorbing heat and becoming liquefied, when it returns to the heating chamber for re-gasification. Small as well as large ammonia outfits are now placed on the market. Refrigeration by means of ice is troublesome, and should only be applied to small ice boxes for temporary preservation of poultry from day to day.

Eggs intended for cold storage should be quite fresh and unfertile. If a few days old or fertile the process will not be a success; there will be a large percentage of bad eggs and the others will be inferior in quality. All eggs should be cleaned before storage, and must be packed in such a way as to enable the low temperature to reach each layer. The temperature should not be below 18 to 22 degrees F. On removal from storage the eggs should be placed in an intermediate chamber and the temperature raised gradually. During refrigeration a certain amount of moisture is lost, and consequently an air cavity is produced in the egg, which is not without influence on their after keeping possibilities. They should, in fact, only be removed from the cold store for immediate sale and early use.

COLONY SYSTEM, THE. The method of poultry keeping known by this name is one which has much to commend it, and that its advantages are being widely recognised is evident from the large numbers of farmers who have adopted it during recent years. It is essentially a method for adoption on the farm, inasmuch, as it not only requires a large extent of ground for its operation, but it also enables farmers to utilize their land to the best advantage by making it carry a very much larger head of feathered stock than was before thought to be practicable.

Briefly, the system consists in the placing of fowls in groups in the various available situations upon the farm, each group being provided with an easly movable roosting and nesting house; and the removal of each colony to fresh ground as the old quarters are sufficiently foraged over, and the needs of cultivation suggest. By such means, the fowls benefit in many ways, but chiefly by the constant removal to clean sweet land, and also by the varied character and quantity of the natural insect and vegetable food—which would otherwise, not only be lost as food, but would in many cases be harmful to the crops grown. It is in this latter particular that the land is greatly benefited, with the further advantage of the manurial value resulting from the systematic removal of colonies of fowls from end to end of a farm. Colonies may in turn occupy arable, freshly-cut



A Substantially Built Fowl House on Wheels, Suitable to the Farmer. (*Boulton & Paul, Ltd*) meadows, and recently carried corn fields; in turn with their longer occupation of the permanent pastures—and all with benefit in turn, concurrently with the production of eggs, at a minimum cost as regards purchased food stuffs.

It is perhaps usual to more particularly associate the laying stock with this method of management, which may, however, be very successfully applied in a more or less modified form to the other feathered stock—and especially chickens being raised for table purpose, which in rapid growth and development, respond wonderfully to this treatment.

So general has the system become, that most of the poultry appliance makers stock houses purposely constructed to meet the requirements of farmers who put their fowls out in colonies. The chief essentials of a suitable house, are a partially open front, covered with strong wire-netting and fitted with a shutter; suitable nest boxes and perches; a good lock and large broad wheels. The whole being stoutly built for wear, and the wheels in particular, being adapted to removal on fields of all descriptions. There is, however, one drawback to the fuller use of this method of poultry keeping, and that is, the danger of loss from vermin—especially the fox; and where foxes are known to abound, great care must be taken to avoid as far as possible, the placing of colonies in the proximity of cover, and the birds must be accustomod to the closing of their houses at dusk.

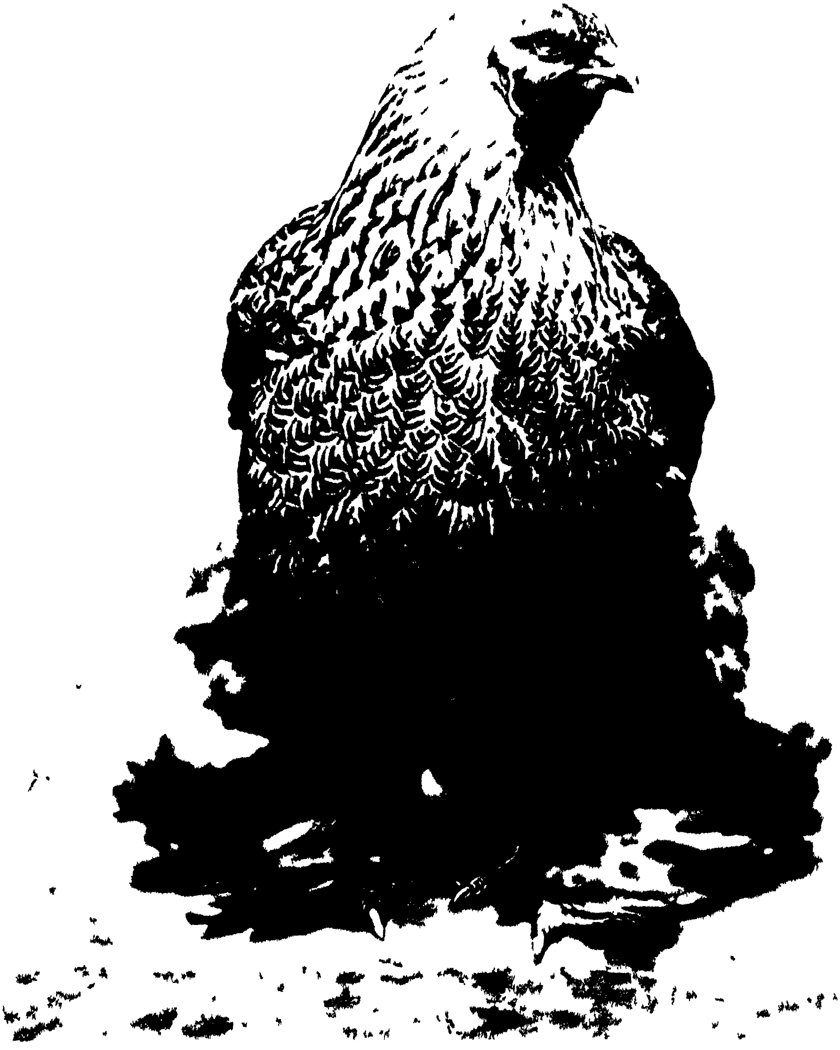
COLOUR, IN EGGS (*see* "Marketing eggs.")

COLOUR IN PLUMAGE. Although the denizens of the poultry yard are perpetually becoming augmented by new varieties differing in colour from any already existing, yet a close analysis reveals that these differences are usually due to new combinations of old material and are not in the true sense of the word novelties. Colour in fowls is due to (1) definite pigments and (2) to structural peculiarities of the feathers. In most birds the colours belong to one of two series, the first, due to the presence of a pigment *zoomelaniun*, comprising white, clay, light brown, dark brown, black; the second, due to a pigment called *zooerythrin*, comprising white, yellow, orange, red, black. The actual shade of colour depends upon the amount and concentration of the pigment, very concentrated forms of either giving a colour which appears black to the eye, while attenuation or dilution results in a variation to red or yellow, or to brown or clay, according to which of the pigments is present in the feathers. In addition to colour due to the actual pigment seen through the more or less transparent cuticle of the feather, colour in plumage is influenced by actual peculiarities in the structure or arrangement of the cells of the superstructure overlying the pigment. Thus there is no such thing as a blue pigment in poultry. The colour of Andalusian fowls is due to yellow or brown pigment which, owing to the arrangement of the overlying cells, appears blue to the eye.

The metallic lustre of the Langshan, again, is caused by the presence of excessively fine striœ upon the surface of the feathers, and in this and allied cases is merely an optical effect owing to the scattering, diffraction or unequal refraction of the light rays. Were these small channels or thread-like lines absent, the Langshan would appear of a dull black, like a Minorca.

Two classes of pigment, then, and their various degrees of intensity, combined with various patterns of superstructure will account for all the different colours found in domestic poultry, and when we add to these the localization of either or both these factors in definite areas the markings of birds are readily understandable. The plan of coloration in fowls takes definite and limited

PLATE No. 22.



(J. Russell & Sons.)

Dark Brahma Hen.

(Bred and exhibited by Mr. S. H. Thomas, Glasfryn, Forest Fach, Swansea.)

Winner of 1st and Cup Birmingham, three firsts at Crystal Palace (Cup twice), three firsts, Specials and Championships Lord Tredegar's Show, 1st and Championship Redhill (twice), 1st and Special Sheffield, 1st and Special Norwich, and 1st and Special Liverpool.

patterns. When we have mentioned spangling, lacing and pencilling we have practically exhausted avian variability in this respect, but the number of combinations possible between pigments of differing intensity and peculiarities of superstructure increase the possible varieties to a formidable number. To take an example: In the blue Andalusian fowl the superstructure of the centre of the feather differs from that of the edge, with the result that we have a bird with feathers blue and laced with a darker shade. We have breeds of all-buff fowls in which presumably we see the yellow pigment through a simple transparent superstructure. By crossing and subsequent selection it is possible to make a variety which combines in its feathers some of the peculiarities of both the aforementioned breeds, as is evident in blue-laced varieties which have the centre of the feather clear buff whilst the blue-tipped edge differs in respect of its superstructure. So, again, with those birds with feathers spangled with metallic lustre. Whether the centre of the feather be white or yellow the tip differs in its pigment and striation.

Even the sexual differences of plumage of Brown Leghorns and analogous breeds may be accounted for partly, if not entirely, by variations in the structure of the feathers, the gorgeous colours of the cock being due to differentiation in the intensity of the pigment in definite areas and to various arrangements of the overlying cuticle. White in fowls is usually due to an almost entire absence of pigment in the feathers. Bi- or tri-coloured varieties have partial albinism in approximately definite areas. as in Lackenvelders, and the peculiar speckled Sussex, which combines metallic black, red and white in widely distributed areas all over the body.

It is possible to effect transitory alteration in the colour of the plumage of some varieties by means of certain chemical substances mixed with the food. Thus, the "colour foods" (cayenne, chillis, etc.), as sold for colour-feeding canaries, if given to fowls before and during the moult may cause them to assume a richer shade than would otherwise be the case; indeed, when fed to white fowls, it often makes them show traces of yellow. When fed with carmine the yellow is destroyed and the birds resume their natural shade. This is accounted for by the fact that a mixture of violet and yellow produces white. It should be added that colour augmented in this way by chemicals (it is a fatty substance called *triolein* which effects the change) is liable to fade on exposure to strong light, needs renewing at every moult and is not hereditary.

COMB. The fleshy excrescence on the top of a fowl's head, generally red.

COMBS—DISEASES OF.

—— **FROST BITTEN.** "Frosty" comb is often to be seen in winter time, and it is most essential that it should be prevented from happening, because it not only makes birds miserable and ill, but stops laying, and affects the fertility of the eggs if the male birds are so troubled. Naturally the complaint only affects birds of the large-combed varieties. These should, therefore, be sheltered as much as possible during frosty weather, and above all things should be kept constantly exercised. Frost-bite, is of course, due to defective circulation, and the more exercise a bird gets the less likelihood there is of its occurrence; at the same time it is almost impossible to prevent cocks with very large combs from being affected, unless special measures be taken with them. The danger lies in the spikes of the comb being damaged—an occurrence fatal to show specimens.

Generally speaking, the best treatment (which should be preventive rather than remedial) lies in vigorous rubbing of the comb with a little vaseline or something of a similar nature. If the bird has unfortunately fallen a victim there should first be a free application of lukewarm water—to "unfreeze" it as it were. Do not use *hot* water, but merely tepid or lukewarm water, keeping the bird in a warm place and applying ointment frequently. If care be not taken the spikes will shrink and fall off, leaving blank spaces or shortened tips. Occasional attention of this sort and protection from cold is very necessary for all show birds and for stock cockerels.

— —**WHITE COMB.** White comb is a parasitic trouble, and it is a very unpleasant disease indeed to get among poultry, for it spreads with alarming rapidity, and only the most drastic treatment will get rid of it. It has nothing whatever to do with paleness of face, a complaint that worries fanciers of birds of the large-combed varieties. It is a scurfy eruption, with a floury peeling of the skin of the comb, and it is not unlike eczema, except that it does not present the red appearance of the skin characteristic of that complaint when it attacks men or animals. Sometimes an actual eruption or running sore will make its appearance, and the comb will be entirely ruined for show purposes unless treated with discretion. The best thing to do in a case of this kind is to saturate the comb, first of all, with paraffin or turpentine, and when this has been done, rub it over with carbolic ointment. Repeat this process morning and night, for three or four days. Some poultry experts recommend sulphur ointment—others white or red precipitate ointment—but the paraffin, followed by carbolic ointment is safe and sure. At the same time, there should be some internal treatment as well, because this complaint has the effect of reducing the poultry to a very weak and debilitated condition. An occasional capsule of codliver oil and quinine should be given, and also some such good liver clearer as Epsom salt, in the drinking water. There is no doubt that this disease is frequently communicated to farmyards by birds which are bought from public markets. It originates in dirty insanitary surroundings, and is a swift Nemesis pursuing poultry keepers, who do not keep their birds under healthy conditions.

COMBS, TORN (*see* "Accidents.")

COMBS. TYPES. The classification of combs includes three principal forms—the single, the rose, and the pea or triple; to which may be added a fourth class embracing various abnormal or peculiar formations. The single serrated form is the most common, although subject to modifications—chiefly of size; in such breeds as the Leghorn and Minorca it has been considerably developed by latter-day breeders for exhibition, and where the large form exists that of the hen usually falls over one side of the face. In some single-combed breeds, however, the type is small.

The rose comb, as in the Wyandotte, is even, rather short and firm; but in the Redcaps it is out of proportion to the size of the fowl—standing erect, having a straight leader, and measuring up to six inches in length and four inches in breadth.

The pea or triple type, as in the Brahma, is really three parallel serrated combs of stunted growth; the central ridge being a trifle higher than those on either side.

The abnormal or peculiar types are various, including the fleshy lump as seen on the Malay, the horned comb of the La Flêche, and the leaf form of the Houdan.

The following list includes the principal breeds, classified according to their comb formation :—

SINGLE.

Jungle Fowl.
Dorking (coloured).
Dorking (silver grey).
Cochin.
Game.
Langshan.

Spanish.
Leghorn.
Ancona.
Sussex.
Plymouth Rock.
Orpingtons.
La Bresse.
Courtes-Pattes.
Minorca.
Andalusian.
Campine.
Lakenfelder.
Rhode Island.
Faverolles (salmon).
Scotch Grey.
Yokohama.

ROSE.

Hamburgh.
Dorking (coloured).
Dorking (white).
Dorking (cuckoo).
Orpingtons.
Redcap.
Wyandottes.
Dominiques.

PEA.

Brahma.
Indian Game.
Aseel.
Sumatra Game.

ABNORMAL.

Malay.
Houdan.
La Flêche.
Sultans.
Polish.
Crêve-Cœurs.
Bredas.
Silkies.

Such a classification is of interest in the endeavour to trace some modern characteristics towards their source, as an instance of which the Polish cross may be traced in the V-shaped or horned comb of the French breed—La Flêche. It would obviously be impossible to elaborate here the various suggestions contained in the above list, but attention may be directed to the great preponderance of the single-combed type, and to the fact that it includes the Jungle fowl in all its known varieties; and it may be further noted that game fowls are found in the three principal classes. The fact that when crossed the Asiatic breeds tend to produce pea combs by reversion is also instructive in reference to the ancestry of these breeds. The Mediterranean group is uniformly single-combed. (*See Coloured Frontispiece*).

CONDITION. The state of health and the appearance of the plumage.

CONFINEMENT (*see* "Accommodation.")

CONGESTION OF LIVER. Liver disease generally is dealt with in a separate article. It is only necessary, therefore, to say here, that congestion of the liver is the simplest form of liver trouble. It may be nothing more than sluggishness, and it is quite easy to deal with; but if it be disregarded it may become acute, and acute congestion of the liver ends as a rule, in inflammation of that organ—a much more serious matter. Congestion may be due to over-feeding, and then, of course, enforced abstinence from food or short rations for a period may suffice to correct it, and give the organ time to recover its usual activity. Again, it may be that insufficient grit is given, and the gizzard, not getting on rapidly enough, prevents the liver from unloading as quickly as it would otherwise. Poultry should always be abundantly supplied with grit; let them also have plenty of green food, without which they cannot possibly be kept healthy. Grass is the best green food for poultry; next to that cabbage—not lettuce, which contains opium, and tends to sluggishness. Watercress is a most excellent food also, and will often produce great benefits. The best physic for congestion of the liver is Epsom salts, a small quantity of which can be added occasionally to the drinking water: any saline aperient, in fact, is good for poultry with a tendency to liver trouble—Glauber's salt, Rochelle salt, and any form of magnesia.

CONSTIPATION. Constipation of the bowels is a far commoner complaint amongst poultry than is generally realized, and it often no doubt has a prejudicial effect upon laying, because it involves general congestion of the system. It is the result, sometimes, of keeping birds in confinement and allowing them too little exercise, and not infrequently depriving them of that varied supply of green food which is essential to their health. Cases of this kind do not occur amongst poultry allowed to roam at liberty in the country—at least, if there is a case of bowel stoppage it is due generally to an obstruction lodged in one of the passages. Constipation may be brought on by other causes, however; as an example: when fowls kept in confinement have been given oyster shell as a special treat, attracted by its fishy and saline flavour, they will gobble it down as though it were grain, with the result that they become constipated and need a dose of salts or castor oil. Householders who keep poultry in a garden run should try giving them coarse brown bread amongst their morning food. Bran would hardly do quite as well, but *whole meal* would answer the purpose, which is to give them a certain amount of waste material to keep the intestines always alert. Poultry keepers should take more note of the droppings of their poultry, because these are often an index of the state of the internal organization, and often give warning as to the need for medicinal treatment.

CONSUMPTION (*see* "Tuberculosis.")

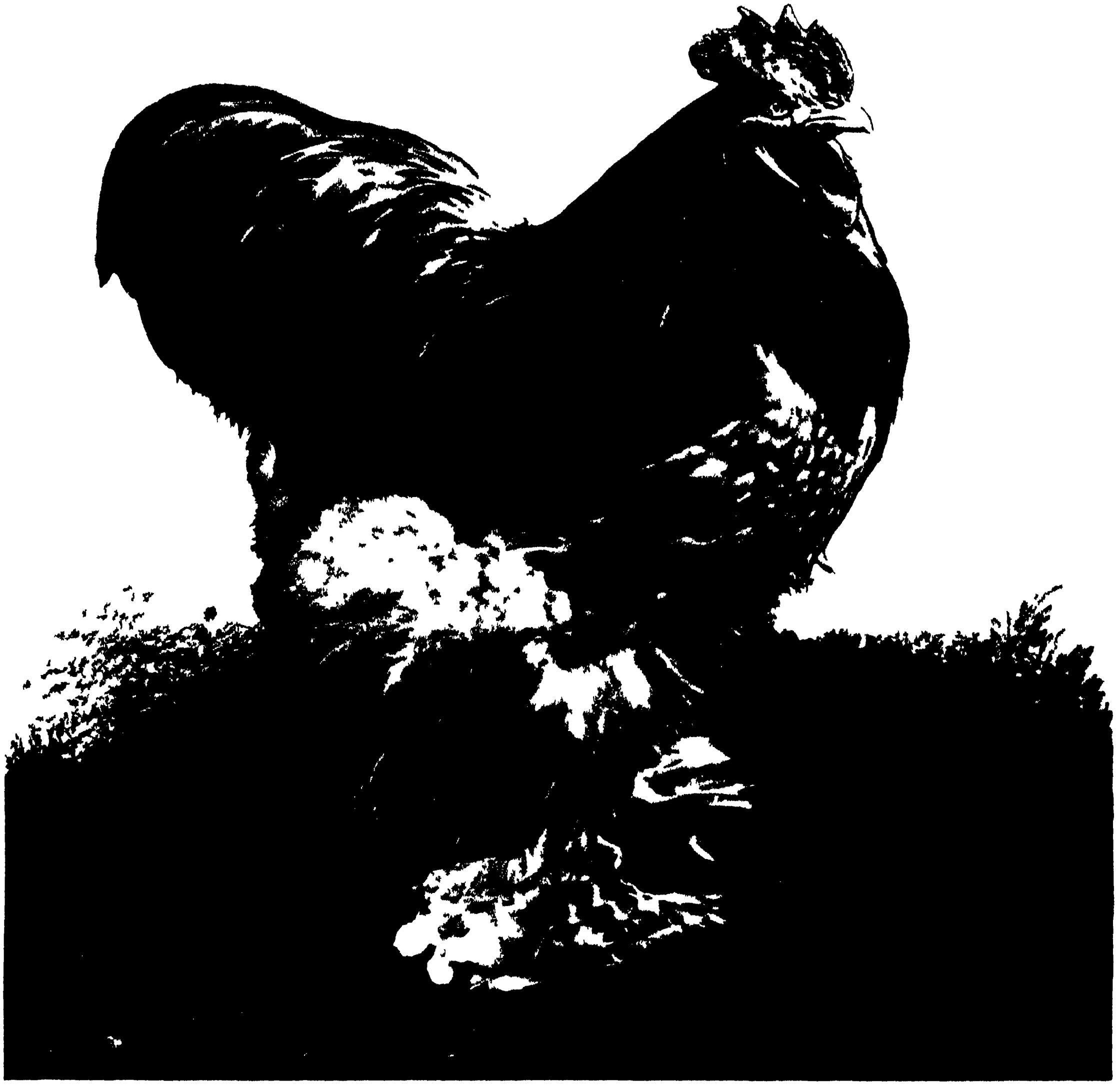
COOKING (*see* "Trimming.")

CO-OPERATION (*see* "Organization.")

COOPS. Despite the continual improvements effected in the construction of brooding appliances, the coops used by those who still adhere to the natural method of rearing under hens usually show very little advance or recognition of the requirements of young chickens. Scratching sheds, open-fronted roost-houses, and hygienic colony houses, are in many cases provided for the accommodation of adult fowls though these have been reared in crudely made and more or less unhealthy coops. Chickens so reared will be predisposed to disease, however suitably they may be housed, when they reach maturity; and to that cause may be traced many failures that cannot otherwise be accounted for under the conditions prevailing when the breakdown occurs; whereas a healthily reared chicken would probably thrive under subsequent disadvantages.

The primary objects of a coop, as usually employed, are the restraint of the hen during the early days of rearing or a spell of bad weather, and the safekeeping of the chickens at night. Strength, durability and security may, however, be obtained, together with sufficient ventilation, but the common haphazard method of making holes around a coop is generally insufficient, and in most cases directly harmful by the introduction of violent cross currents of air. Some of the appliance makers have devoted more attention to the construction of healthy coops during recent years, but a satisfactory coop need not necessarily be an elaborate or expensive affair. The design is of very little importance, provided the slope of the roof is sufficient to throw off the rain, and that the interior is large enough for the birds housed in it. The roof, sides and back must be wind and rain proof, and the front may be provided with bars in the ordinary way; but the usual ventilation holes should be omitted unless arranged in such a manner as to make a draught impossible—and some such plan as the following adapted. A very satisfactory coop may be made without any other ventilation than the free exchange of air by an open front, the structure being otherwise made entirely draught proof. In place of the usual solid and tightly closed door for use at night, a strong frame should be used, fitted with sufficiently secure fastenings; the centre being covered with half-inch mesh wire-netting for the exclusion of vermin. This may be covered in turn with loosely-woven canvas, stretched tight and fastened to the wooden frame. All the fresh air advantages of the open front may thus be secured without any loss of security, and with an entire absence of draught. As a further pro-

PLATE No. 23.



Buff Cochin Cock.

(Bred and exhibited by Mr. G. H. Procter, Flass House, Durham.)

Winner of 1st and Challenge Cup Royal Show, 1st and Special Crystal Palace.

tection against driving rain, or the direct rays of the sun in summer, the coop may be made with sufficiently projecting eaves, or a wooden shutter hinged at the top and capable of being fixed at any desired angle.

Another very useful type of coop is made double the usual length, one half being used for sleeping quarters and the confinement of the hen, and the other half (separated by wooden bars) for the feeding and sheltering of the chickens, the front of the second or chicken compartment being wire netted, but fitted with a small door by way of which the chicks may gain access to the open run.

The necessity for a floor in any description of coop depends upon the season and other considerations, but it should be dispensed with whenever possible, the coop being placed upon short clean turf. If rats are troublesome the use of a floor is unavoidable, unless the coops are placed in the middle of a large field and moved frequently, rats being chiefly a danger near hedges and shaws or woods. When bottomless coops are used in a district where foxes abound, it is necessary to peg the coops down—driving wooden pegs through loops of large-gauge wire fastened one on each side of the coop —otherwise they will probably be overturned; and the same precaution must be taken when sheep are run in the same field, on account of their habit of rubbing against any such structure.

Type of Coop generally in Use.

COUCOU DE MALINES (*see* " Malines.")

COUCOU DE RENNES (*see* " French Breeds.")

COUNTY COUNCIL COURSES (*see* " Instruction.")

COURTES PATTES (*see* " French breeds.")

CRAMMING. Feeding fowls artificially, by means of a cramming machine or by hand (*see* " Fattening.")

CRAMP. Cramp is essentially a complaint affecting chickens and ducklings. It is, in truth, a form of muscular inactivity, and most probably arises from imperfect circulation — the chicken or duckling not having enough warmth in its body to keep its blood warm. It affects the legs, causing the bird to squat down in an absolutely helpless condition. Cramp needs to be carefully distinguished from leg-weakness—a form of rickets for which it may easily be mistaken, or *vice versa*, which may be (too often is) mistaken for cramp. The one is a rheumatic condition—the other a constitutional ailment, dependent upon the bone formation. If a chicken is constitutionally delicate, or if it is not fed upon suitable frame-growing food, its leg bones will not grow as they should, and the result will be that the body will become too heavy for the legs to carry it. This condition, however, is easily distinguishable from the condition of a bird which has cramp. In cramp the limbs are quite paralysed (temporarily), the claws being drawn up much in the same way as a man draws his fingers together to form his fist; but in leg-weakness there is not so much paralysis as weakness. Cramp comes on by reason of damp surroundings, and is a result of depriving chickens and ducklings too early of the hen's natural warmth. It is often fatal – obviously because a brief period of cold will not only stop the circulation in the extremities, but in the body as well. The lungs and heart are as susceptible to cold as any other part, and chickens will quickly die of cold. In the early part of the year, then, it is of great importance that abundant warmth be provided; and especially is this important where chickens are being reared on foster mothers, the probable result of a lamp going out early during some cold night being rather serious. As to the treatment for cramp, two things only are needed—warmth and friction to restore the lagging circulation. To assist in friction and to stimulate the circulation directly at the same time, use a good penetrating liniment or embrocation, and rub the legs freely with this, keeping the bird in a warm place standing on flannel. Of liniment or embrocation there are many kinds: the common or household, simple known as "hartshorn and oil," will answer very well, as will also the "turpentine liniment" of the British Pharmacopœia. Anything of this kind, and indeed, any of the well-known embrocations advertised will answer the purpose.

CREST. A bunch of feathers on the top of the head, sometimes called a top-not.

CRESTED AND BEARDED FOWLS. The question of the origin of crests and beards on fowls is primarily the question of the origin of the Polish fowl, whose history is so obscure and involved as to be impossible of accurate tracing. That the solution of the first question is practically involved in that of the second is fairly obvious from the repeatedly expressed opinion of authorities, that the French breeds partake strongly of Polish ancestry, an opinion supported by reasonable evidence. The Crêve-Cœur, the Houdan, the Faverolles, are all held to owe so much at least to a Polish cross, and in reference to these and other local French varieties, the late Mr. Lewis Wright remarked upon the merits of the Polish race in respect of egg production and quality of flesh, and "the possibility of grafting these upon increased size and hardiness; or as in the case of the Crêve-Cœur, of adding to the size while preserving the Polish blood." And it may be remarked that Mr. John Bailey claimed to have imported the first Polish fowls (with top-knots), in 1835, and he stated that the first bearded fowls were imported some years later—both from the Continent. The large crests, beards and muffling seen in the modern representatives of these breeds are of course mainly the production of fanciers who have followed a more or less rigid selection in mating for exhibitional purposes.

In a book entitled "Fowls," written by Mr. John Bailey, and published in 1860, the author writes relative to what he terms "Poland" fowls, that beards "were not admired till recently, and it is still a question of dispute, whether the pure bird should have them or not. . . . I think it but fair to state as an importer of very many years standing, that among the early birds brought from the Continent not one in a hundred was bearded, and those that were so were often rejected. The first really good pen I ever saw was at the show held in the Zoological Gardens, Regent's Park, in 1846. They were exhibited by the late Lord Saye and Sele." The same writer states that "The original Poland fowls were black with white top-knots, and gold and silver spangled." For descriptions of the various crested and bearded fowls, the reader must be referred to the several sections dealing with the breeds concerned.

CRESTED DUCKS (*see* "Waterfowl.")

CRÊVE-CŒURS (*see* "French breeds.")

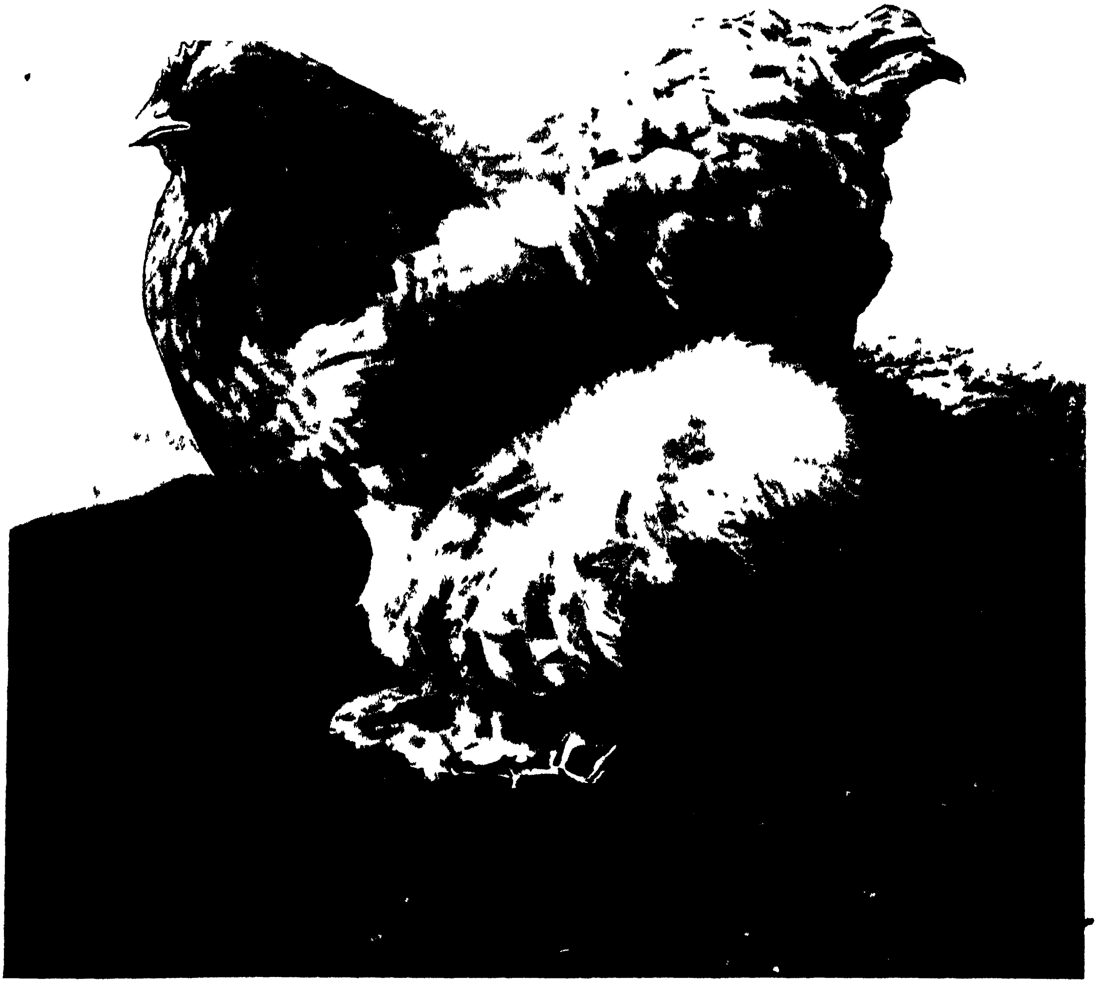
CROP. The bag into which the food is received before passing into the gizzard.

CROP TROUBLES AND INDIGESTION. Crop-binding is one of the commonest of all the complaints to which poultry are liable, and it is one which causes amateurs generally a good deal of loss, until they learn how to deal with it. In effect, it is simply congestion of the crop, the contents of which, for some reason or other, cannot be persuaded to pass on, and consequently become unwholesome, fermentation being set up. It is of course, highly dangerous to allow such a state of things to go on, and relief should be given as quickly as possible. There are two main causes of crop-binding—mechanical obstruction and indigestion or general debility, and consequent general disorganization of the system. When the gizzard is not working properly, or the liver is sluggish, the food naturally does not pass on from the crop with the same rapidity as it does when all the organs are in good working order. The best cure for a condition of this nature is, obviously, to give the organs a rest; and often it will suffice to let the bird have no food for twenty-four hours, but to let it drink freely of water made slightly aperient by the addition of a few grains of common Epsom salts. Some birds fatten internally more freely than others, and these are the most likely subjects for this complaint, as their system generally tends to become sluggish, and consequently crop-binding is more likely to affect some breeds than others. Then, again, it is especially prevalent at certain seasons of the year—that is to say, at hay-making time and in winter, when cattle and horses are being fed upon hay. The reason is not far to seek. Poultry are very fond of grass seeds, and in trying to enjoy the seeds they swallow the spikes of hay; these collect into a ball of woven hay, etc., sometimes almost as hard as a cricket ball, which cannot pass on--hence fermentation is set up, and we get the condition known as crop-binding. It is necessary to give relief as soon as possible. Some little judgment is required as to when an operation is needed, and it sometimes happens that a dose of castor oil given with some warm water and a gentle kneading of the crop, will put matters right and enable the bird to digest the softened mass. If not, other measures must be resorted to. First, then, obtain some tepid water in a jug with a narrow mouth, add a grain or so of permanganate of potassium to the water, so as to render it deodorous and slightly antiseptic, and then pour a table-spoonful or thereabouts, down into the crop, holding the bird's mouth open and pouring in slowly, so as to admit of the water being gulped down a little at a time. Then after kneading the crop to loosen the mass, stretch the neck downwards and carefully squeeze out the contents. Suppose now the mass will not yield to treatment, an operation must be resorted to. This is not dangerous, so long as it is carried out in a careful manner and with due regard to antiseptic considerations, which are as necessary to be observed in veterinary practice as in human surgery. In opening the crop, it is necessary to cut first of all through the outer skin of the breast, and then through the crop sac itself. An incision should be made about an inch to an inch and a-half in length, a little to the side of the ball which the congested crop presents. Before using the knife, pluck away a few feathers so as to leave the way clear. The incision being made the contents of the crop should be carefully drawn out by the use of a small bone mustard spoon, and the crop should then be washed out with tepid water containing a grain or two of permanganate of potassium. The sewing up of the wound is the part needing greatest care, lest septic trouble be set up afterwards; it is also important (especially in the case of a valuable bird), that the wound on healing should not leave a "pendulous" crop. Great care should be taken not to sew up the crop skin to the skin of the breast: the cut edges of the inner skin must be sewn together first, and then the edges of the outer skin. In sewing up use silk thread or fine catgut, and employ a needle which has been heated to redness in the fire or in a gas jet. Let each stitch be tied separately. Three stitches should be sufficient for each skin. After the two skins have been stitched separately in this way, smear a little carbolized vaseline on the outside, and fix a cardboard collar round the bird's neck, so that it cannot reach the place with its beak. Let the patient be kept for a day or two on soft food such as stiff oatmeal porridge. Liquids must be withheld for the first twenty-four hours at least, as they will tend to exude from the wound.

—— **SWOLLEN ("SOFT CROP.")** This is a watery condition of the crop, the sac of which is pendulous and its contents more or less watery. It is one of the results of indigestion, and is due to wrong methods of feeding or over feeding, while sometimes general ill-health leads up to the same condition. There is no better course of treatment than to give the bird doses of charcoal, and keep it on fairly low diet for a time in order to allow of the system being cleared thoroughly. Charcoal is dirty, troublesome stuff to handle, and can best be administered in the form of capsules. A 15 or 20 minim sized capsule, morning and night, for a week, will often work wonders. Charcoal, it may be added, is an invaluable remedial agent in all cases where there is soreness of crop or anything of that sort indicated generally by an unpleasant odour of the breath. It must, however, not be continued too long, and after it has been given continuously for a week, as suggested above, it should only be given in occasional doses when necessary. Some cases of swollen crop are not "watery" but "windy"; obviously this is due to the same cause—fermentation of food, the production of gases, and the unnatural distension of the crop in consequence. Birds which suffer in this way are really not worth keeping, and in the case of valuable specimens there is the probability that distension of the crop will give rise to the condition known as "pendulous" crop—similar in appearance to the hanging crop of a pouter pigeon—a fatal defect, of course.

CROSS-BRED. A fowl produced from different varieties. First cross: a bird bred from pure-bred parents of two different breeds. Second cross: bred from first-cross birds, mated with those

PLATE No. 24



Buff Cochin Hen.

(Bred and exhibited by Mr Geo H Procter, Flass House Durham)

Winner of 1st and Challenge Cup Crystal Palace 1st and Challenge Cup Birmingham of a pure breed (*see* "Breeding, cross.")

CROWING, NUISANCE (*see* "Legal.")

CROWS (*see* "Enemies.")

CUCKOO. Light grey plumage, each feather being tipped with slate.

CUSHION. A raised mass of soft feathers on the rump of a hen, seen in the Asiatic breeds, almost obscuring the tail.

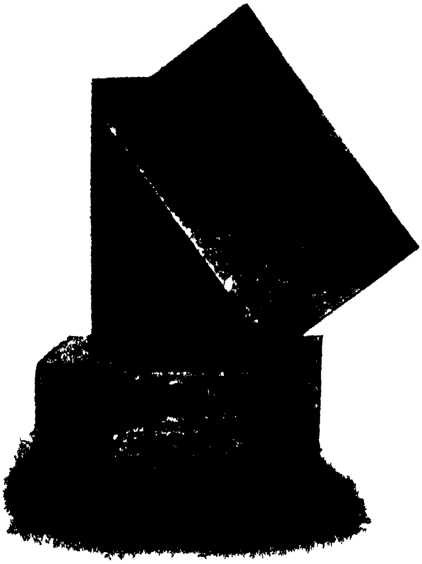
DATES FOR HATCHING. At the commencement of poultry breeding the novice does not generally appreciate the all-important fact of the influence of the hatching date upon the object of his production, and its results. The overmastering wish to make a start is apt to obscure the fact that operations may have been begun a little too early or a little too late for the fulfilment of a profitable finish, and there is a failure to understand that for some purposes it is at some periods more profitable to be without any chickens than to be successfully hatching them. The date of hatching has an important bearing upon the question of production for market, as regards all descriptions of feathered stock; the margin of profit being insufficient to leave any room for mistakes in this direction. There are some seasons at which all but the most experienced, or those favoured by special circumstances, should refrain from production owing to a probable inability to command a sufficient return to cover the cost of rearing and other expenses; and in the matter of laying stock the hatching date is of equal importance, because a very little error of judgment is sufficient to so add to the cost of the fowl before it commences to lay, that no subsequent egg yield will recover the lost ground.

—— **TABLE FOWLS.** An all-the-year-round production of chickens for market is in some cases not only possible, but upon the average profitable; yet it is not a branch to be continuously undertaken without special facilities for disposal at remunerative rates. For the spring chicken trade hatching operations should be commenced in December, and those that do not reach a suitable size until the summer and autumn will mature upon a falling market; and it is necessary to remember that autumn hatching implies a lengthened rearing period. The novice would do well to refer to the section dealing with "Poultry Values," wherein are set forth the average prices ruling at the different seasons, and by deducting from four to six months from the period aimed at, he will arrive at the suitable hatching date for his purpose.

—— **TURKEYS, DUCKS AND GEESE.** As the growing demand for medium-sized turkeys is fairly well met by the foreign importations, and as the value per pound of these birds increases with the total weight, it is generally preferable to aim at the end of the year demand for birds of size. To do so it is necessary to hatch in April, no subsequent hatching producing birds that can compete with them or attain to the same ultimate value—a value which more than compensates for the increased rearing period. Geese almost always commence to lay in February or March, and after the first two or three eggs of each bird, the others should be set in a succession of batches as produced. Ducks should be mated in October and their eggs also set in a continuous succession as produced, in order to hatch early ducklings.

—— **LAYING STOCK.** The hatching of pullets for egg production does not allow of much margin as regards the most profitable period, although there is some little latitude according to the different breeds and their rate of arriving at maturity. As a general rule March and

April are the most suitable months, although some of the more active breeds may be hatched as late as May. If the laying stock be hatched before March there is the danger of the birds going into moult, with the consequent and fatal delay at the time they should be coming into profit, whilst a too late hatching delays maturity and also frequently results in the loss of the first winter's profit—and the first season's production is essential to the total profitableness of a layer's working career.

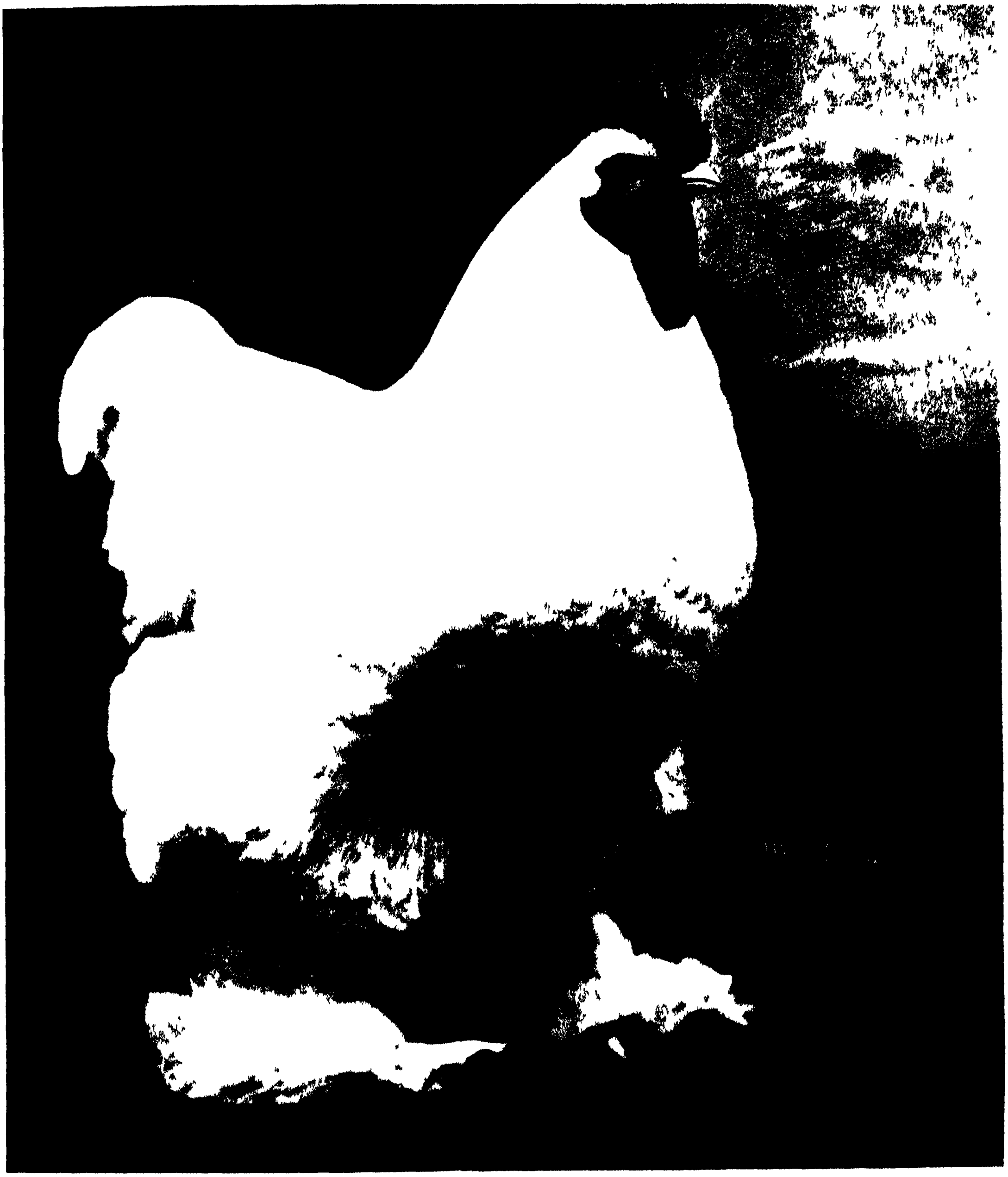


Chicken Boxes.
For sending Day old Chicks by Rail (*Meech*)

"DAY-OLD" CHICKENS. The sale of newly-hatched, or to use the trade term "day-old" chickens, is a branch of production of comparatively recent growth in this country, following upon the lines of an extensive business which had been done upon the Continent for a considerable time—the chickens dealt in by continental poultrymen being of any age up to about a week old. From the point of view of both seller and buyer it is, however, more advantageous to deal in chicks that are actually, as well as in name, a day old—and it is certainly better for the birds themselves. When disposed of at that age the chicks require no feeding previous to their despatch, which takes place soon after they are dry enough to leave the incubator. As is well-known to poultrymen, newly-hatched chickens contain within themselves Nature's provision for the first twenty-four hours, in the form of a large proportion of the yolk of the egg—from which they emerged—which is drawn into the abdomen immediately before hatching. Any ordinary journey within the British Isles will be easily accomplished before the nutriment within them is entirely exhausted, and they are healthily ready for their first meal. The buyer, moreover, has the advantage of feeding them according to his own method right from the beginning—just as if he had hatched them on his own premises, and there is no danger of digestive derangement owing to change of food. If, however, there is from any cause a delay in getting them off, it is usually found that they travel better on a feed of biscuit meal than anything else. Any delay is, however, found to militate against the success of the venture in proportion as the period is increased, but when sent at the proper time they will stand journeys occupying as long as from twenty-four to thirty-six hours.

Boxes of various patterns are used for sending the birds away in, but it is essential that they should have a sufficiency of ventilating holes near the top; and the sizes in common use approximate to 14 inches, by 9 inches, by 9 inches, for a dozen chicks—whilst about 15 inches square is a usual size for two dozen birds. The lid should be lined with flannel so fastened that it rests lightly over the birds and keeps them warm, the box itself and especially the corners being lined sufficiently with soft hay. Such boxes are tied, not nailed, and bear a label describing the contents in prominent

PLATE No. 25



White Cochin Cockerel.

(*Bred and exhibited by Mr. F. R. Eaton, of Norwich*

Winner of 2nd Crystal Palace, 1906.

lettering. The safe method is to despatch by fast passenger train, having previously advised the buyer of the time and date of departure—with the probable time of arrival. The buyer must be fully prepared for the reception of chickens sent in this manner, and should as soon as possible, place them under a reliable broody hen, or in a brooding house or foster mother, allowing them time to get thoroughly warmed and then feeding with warm milk and biscuit meal; and if the journey has been successful, and the chickens are healthy and normal, they will within a few hours behave in every way like newly-hatched birds produced on the premises and may be subsequently treated as such in all particulars. Such a method of doing business is an advantage to the seller whose land is insufficient for rearing purposes—and the mere incubation may, of course, be carried on without any land at all, as it is in some instances; and the source of supply is an advantage to those who have land, but who, owing to a failure to produce sufficient eggs, or lack of experience or time for extensive incubation need more birds than they can actually produce themselves. In the case of special or prize strains the arrangement is satisfactory to the buyer, who is certain to receive the number of birds he requires, without the delay and annoyance entailed in the setting of eggs, exchange of infertiles, and other hindrances.

Removing Day Old Chicks from Incubator Trays to Boxes ready for Despatch.

Although this branch of production has from time to time received some considerable amount of notice in the Press, and the Board of Agriculture has considered it of sufficient importance to make it the subject of an official leaflet, it would be a mistake for the novice to attempt much in this direction until experience has been gained and an outlet for all the possible output assured. It must be remembered that the demand for such birds must inevitably be limited, and more especially by the seasons; and that there are very many already engaged in meeting the demand. The chief output of such a production would, in ordinary circumstances, be during the first six months of the year, when it would be essential to secure a regular supply of fertile eggs for filling the incubators engaged in the work; this implies an ultimate reference to the breeding stock, their suitability as regards breed, constitutional soundness, mating, housing, feeding, and all the factors involved in the production of fertile eggs and sturdy chicks. Above all things, it would be necessary for such birds to enjoy the freedom of a good grass range, without which the resultant chicks would not possess the stamina so essential in such an undertaking. Although cross-bred chickens suitable for table purposes are more hardy and suitable, the demand hitherto has been mainly confined to pure breeds, for which the price asked is, of course, correspondingly higher—but the risks and difficulties are naturally greater. Relative to the cost of production, experiments conducted at Reading College Poultry Farm, Theale, in the spring of 1904, show that (assuming the cost of an egg to be one penny), allowing for 30 per cent of fertile eggs failing to hatch, the actual expense of producing a chicken was approximately 1¾d. Putting interest and labour at the same amount, the prime cost was reckoned at 3/6 per dozen—to which would be added the cost of package and conveyance to the railway station.

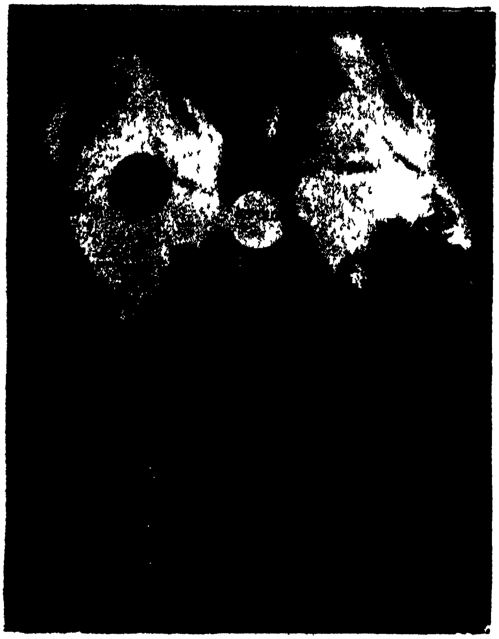
DEAD POULTRY (*see* " Marketing.")

DEAD POULTRY. PREPARATION FOR SHOW. Any ordinary marketer of poultry should presumably be able to suitably prepare fowls for exhibition, and the knowledge may be fairly well acquired by the average poultryman who reads the articles on " Marketing," and more particularly the section dealing with the methods of preparing the dead birds. Nevertheless a percentage of fowls may be seen at any large show of table poultry which have been wrongly prepared—probably owing to the neglect of the exhibitor to study the particular show directions, or, as is equally probable, on account of a failure to understand the wording, which is often misleading or ambiguous. The deliberate entry of a specially fattened couple in a class for birds naturally fed and not crammed, is altogether another matter; and such entries are naturally disqualified by judges who know their business. It is, however, in the matter of plucking, tying, or breaking the breast bones that mistakes are frequently made; another common fault being the exhibition of badly matched couples, both as regards weight and appearance—all of which is inimical to the interests of the man who pays the entry fee. In many schedules it is the custom to state that exhibits must be " trussed, but not drawn," the meaning of which is absolutely misleading to the novice, although plain enough to the old hand. For the generality of such shows all that is necessary is to kill, pluck (except on head and neck, or as otherwise stated), stub, lightly tie round the hocks, and shape the legs and wings as for marketing—which is not what the uninitiated understand by trussing in the ordinary use of the term. Care should be taken to wipe clean the shanks and feet, and if necessary the head—particularly the beak. On no account should the breast bone be broken. The Dairy

Pair of Fowls dressed for Exhibition.

Show conditions, which are the plainest in wording, define what is meant by trussing, the clause reading as follows :—" All birds in these classes must be sent killed, plucked (except on head, neck and pinions) and trussed (shaped for market purposes), but not drawn, scalded or singed. The breast bones must not be broken. The birds may be caponised or not. Fineness of quality, smallness of bone and absence of offal will be considered in preference to mere weight."

The usual defect of all such clauses is, however, that they set no limit to age, and consequently old fowls frequently compete with soft young chickens—often to the detriment of the latter and better birds.



Pair of Turkeys dressed for Exhibition.

DEAF-EARS. Lobes of loose skin hanging from the real ear, same as ear lobes, generally white or red.

DEBILITY. Debility is not a disease in itself, but is rather a symptom of disease. It is true that some poultry suffer, as men suffer here and there, from a perpetual debility. These are what may be called " bad-doers." They never do any good to their owners, they are never profitable and their lives are seemingly one long protest against living at all. Debility, then, may be classified as being of two sorts—first, there is the debility that arises from some passing illness which can be dealt with and cured ; and then there is constitutional debility which nothing will cure. To deal with the latter first, it may be said at once that " bad-doers " do not pay for treatment ; chickens there are to be seen in every farmyard, which never seem to thrive from hatching time onward, but are always moping about with a plaintive " tweak," looking about half the size of their brothers and sisters of the same age, and too often (and this is where their unprofitableness chiefly lies) fouling the ground with unwholesome excreta, and thus really interfering with the progress of the rest. Such birds are far safer put out of the way at the start. Once a chicken falls behind the rest it is always a doubtful question whether it will ever do any good. No amount of care and attention will bring on a bird that is not strong constitutionally, and time so spent might be more profitably devoted to more promising stock. But now in regard to debility arising from an illness. Many valuable birds are lost by neglect when they have recovered from some serious attack ; in fact, it is no exaggeration to say that want of good nursing often causes the death of a convalescent bird. Who shall say what are the sufferings of a bird that has pulled through an attack of pneumonia, only to be turned out by a thoughtless owner in weak and emaciated condition among a lot of other birds to " rough it " once again ? Poultry which have been ill *must* need to be toned up afterwards ; those which have not been ill, but are suffering from general debility due to want of sufficient food, or to want of grit to enable them to digest their food—all alike need tonics. What are the best for poultry? Experience points to cod. liver oil and quinine as the two best tonics for poultry; and these may be obtained from veterinary chemists in combination in small flexible gelatine capsules, which are clean and convenient to administer. The cod liver oil builds up the wasted tissues and the quinine is a nerve strengthener—so the combination is a good one. Quinine and sulphate of iron pills are also good—half a grain of the former and one grain of the latter, combined with a little extract of gentian and some liquorice powder to make a suitable pill. "Blaud's" iron pills—the ordinary sort sold by chemists for anæmia, are a good remedy for poultry needing tonic treatment; then there are various spices and condiments (for which see separate headings in this work).

DEFECTS (*see* "Breeding" and "Mating.")

DEFORMITIES (HOW CAUSED.) A deformed bird is of no value to anybody. It is not available to win prizes at shows, however valuable it might otherwise be; and it is certainly not of much (if any) value from a utility standpoint. Nevertheless a good deal might be said on the subject of deformities, but the most important one of all is the deformity known as "crooked breast"—a great eyesore in a table-bird. This is due to allowing chickens to roost on perches too early. Growing chickens should never be allowed to perch—at least not until they are pretty well full grown—because during the time they are growing the bone is soft and pliable, and if a chicken is allowed to balance itself on a perch the probable result will be that there will be an indentation in the breast bone—or the breast bone will be actually bent in such a way that it will never be straight—a fatal defect in any bird, "show" or "utility." Keep all growing chickens, therefore, on floors to roost. With regard to abnormalities and deformities in general, these are in most cases due to something going wrong at hatching time. People have a bad habit of interfering too much with the hens and eggs when hatching is proceeding. The golden rule is that no chicken is worth helping out which cannot get out of the shell by itself.

DEVELOPMENT OF EMBRYO (*see* "Incubation.")

DIARRHŒA. Diarrhœa, or looseness of the bowels, is the simplest form of intestinal disorder. It is catarrhal in its origin and closely resembles catarrh of the nostrils, which is caused by irritation of the lining of that organ. Catarrh of the nostrils causes roup; catarrh of the intestines gives rise to diarrhœa. It may be due to the presence of sour food or any similar irritating matter; or it may be one of the results of congestion or inflammation of the liver—the food, instead of being properly assimilated, getting into the intestines in a state of fermentation. Again, diarrhœa may be due to the consumption of something in the nature of a mineral poison, like white lead (a common occurrence when painters are at work on the premises), or it may even be due to the presence of worms which sometimes trouble poultry. Whatever be the cause, the diarrhœa indicates intestinal irritation and that irritation needs to be allayed. The best cure is to give the bird a dose of castor oil first. This will clear away the cause of the trouble, and then, if doses of sweet oil be given subsequently, the inflamed and irritated condition of the bowel will gradually subside. The old method of giving chalk powders and mixtures was based upon a wrong theory altogether; these things tend to retard rather than to promote recovery. It is obviously absurd to give a gritty substance like chalk for such a complaint. Instead of adding more irritating matter to what is already in the bowels, clear away that which is actually present. At the same time the bird must be treated for liver complaint, or whatever disease appears to be the principal cause of the diarrhœa.

DIGESTIVE PROCESS, THE. So all important is it to profitable production that the digestive process should be unimpaired, that some knowledge of the organic functions is essential to the feeder of fowls. The average poultry keeper is, of course, aware of the fact that the maintenance of life, the growth and development of the bodily organs, and reproduction are in some way dependent upon the quality and quantity of the food supplied to, and consumed by, his stock ; yet a detailed, although elementary, understanding of the process involved is seldom acquired, or regarded as a necessary part of the practical mental equipment of the poultryman. Such a knowledge of the broad facts is essential to a proper appreciation of the character of foods and their adaptability to the several objects of production, as well as to a correct treatment of birds in health and disease. The digestive process is that through which nourishment is received, consequent upon the preparation and modification of food for assimilation to, and appropriation by, the bodily organs by its conversion into blood ; and the main details of a somewhat complex series of operations are as follows :—

—— **VOLUNTARY AND INVOLUNTARY ACTION.** The commencement of the process is entirely voluntary, and consequent upon the individual discrimination or instinctive selection in the initial choice and appropriation of food by the bird. Under domestication the choice of the fowl is more or less limited according as it is kept in a state of confinement or run at liberty, the bird being, however, in either case in some measure dependent upon the judgment of the feeder as regards the suitability of the foods supplied and available. Nevertheless the process under consideration commences with the voluntary action of the fowl in seizing or taking hold of the food, employing for that purpose the bill—which is in birds the organ of prehension. The food is then and immediately forced backwards towards the gullet by the action of the tongue, and voluntary action ceases. During the subsequent progression of the food or aliment, the action is involuntary, depending upon a succession of contractions and dilations of the muscular walls of the different sections of the alimentary canal—the name given to the whole passage which begins at the base of the skull and continues through various modifications to the anus, from which are discharged the innutritious and undigested food products.

—— **THE ÆSOPHAGUS.** The æsophagus, or gullet, is that portion of the alimentary canal which the food enters after its backward pressure by the tongue, and is parallel with the windpipe or trachea. It is on account of the juxtaposition of these two passages that great care is essential in the machine cramming of fowls ; and unless the tongue is pressed down during the insertion of the nozzle of the tube, it is quite possible and easy to force it into the wind-pipe, and by filling this with food to suffocate the unfortunate fowl. When in a state of rest the æsophagus remains collapsed with its sides in contact, but dilation immediately results with the reception of food, which by a succession of the muscular movements already referred to is passed along the passage to the first enlargement of the alimentary canal, which is usually called the craw or crop.

—— **THE CROP.** This may be practically described as the first of three stomachs, the others being known as the glandular stomach and the gizzard. The crop is placed in front of the breast bone, and is a more or less capacious receptacle for food in bulk; its size enabling a fowl to make a full meal for future digestion, but there are natural limitations, the exceeding of which may result in a derangement known as crop-binding—which frequently necessitates a troublesome operation for the relief of the bird. There are certain secretions within numerous glandular vessels in the crop, by the action of which the food is macerated, and partially softened before its further propulsion along the lower portion of the æsophagus, and its entrance into the smaller cavity (or second enlargement) called the glandular stomach. Within this cavity the gastric juices mingle with the macerated food, and dissolution, modification, and conversion into new substances progress considerably.

—— **THE GIZZARD.** This is in grain-eating birds, including fowls, an organ of remarkable muscular power, the central cavity of which (with its thick walls) crushes and grinds the greater proportion of the food entering it; using for that purpose the sharp grit which fowls so eagerly and instinctively appropriate for its use. An examination of the gizzard and its normal contents will do much towards the realization of the vast importance to the effectiveness of the digestive process, of a sufficient supply of suitable material for the constant replenishment of the grinding agents. From the gizzard the aliment progresses through the intestinal canal for the completion of the digestive and assimilative process.

——**ASSIMILATION.** Having briefly traced the course of the alimentary canal, with its various modifications and the progress of the food consumed, it only remains to indicate as shortly as possible the results of digestion and the method of assimilation in its final stages. Blood is the source whence all the bodily organs derive the materials of their growth, development and nutrition; and the essential nutritive elements are assimilated from the food during its passage of the alimentary canal. Development is the process by which the tissues or organs of the body are formed, or changed in shape and composition, or advanced to a state of perfection. Growth, usually coincident with development, is the increase in the size or bulk of a part, or the increase of power, by the addition of material similar to that already existing. Nutrition is the process of maintenance of form, size and composition. The performance of these functions depends primarily upon the composition of the blood, which in turn depends upon the suitability, digestibility and assimilation of food. The pulped food in the intestines is brought under the action of fluids or juices, and separated into chyle—the portion absorbed into the system—and various innutritious matters which are excreted. The chemical composition of chyle (albumen, fat, fibrine, salts, etc.) is practically that of blood—the final product of digestion. In other words, chyle, which is formed from digested food and absorbed from the intestines, is in fact incipient blood and eventually enters into circulation as venous blood. The absorption of chyle, which is the completion of the digestive process, is effected through the medium of the mucous membranes or inner coat of the intestinal canal. In the intestines the surface of the membrane, which is composed largely of laterally grouped tubes, is covered with very minute velvet-like projecting bodies termed villi; and each villius has a group of thread-like vessels, termed capillaries, through which the fluid matter is conveyed and eventually reaches the veins and arteries. Every cell or particle of the various bodily tissues has the power of attracting desirable material from the blood and assimilating it to its own use; the various organs being thus supplied from the common food source with their requisite nutriment, their waste products being separated in turn from the circulating blood through the agency of the excretory organs—lungs, kidneys and skin.

DIPHTHERITIC ROUP (*see* "Roup.")

DISEASES AND SYMPTOMS. The following are the most common diseases of poultry, and the common symptoms of the various diseases. It is well to bear in mind, however, that the whole of the symptoms of any disease may not be exhibited, and when a subject is suffering from more than one disease the symptoms of one form may mask other symptoms. In order to ascertain the health of a fowl it should be examined from head to feet in regular order, so that no external part of the body may be overlooked, and then the apertures of its ears, its mouth and vent should be examined. For further particulars, refer to the various diseases under their names.

——**ANÆMIA.** Paleness of face and comb, flabbiness of comb, loss of gloss on plumage or a general scurfiness of comb are the common symptoms of an anæmic, that is, a deficiency of blood condition or poorness of blood.

——**APOPLEXY.** In cases of apoplexy the head is held back, or hangs downwards, and usually turned to one side, the affection being due to disease of the brain or pressure upon its blood vessels.

——**BRONCHITIS.** Rattling in the throat is a symptom of chronic bronchitis. In acute cases the head is very hot, and the subject repeatedly drinking. There is a wheeziness in the breathing, which may not be detected without placing the ear on each side of the spinal column of the fowl near the buts of its wings. In some cases there is a catchy kind of a cough.

——**CATARRH (COLD).** The eyes are watery, and in some cases red, and moisture may be exuding from the nostrils, and the plumage of the subject does not lie naturally close to its body. In most cases there is a slight cough. These so-called colds are usually contagious, and consequently due to the action of disease germs. (*See* "Roup.")

——**CHOLERA (SEPTIC FEVER).** The subjects of an attack of septic fever, the so-called chicken cholera, usually remain in one place most of their time, and in some cases, if not disturbed, until death takes place. If a move is made it is usually to the drinking place, thirst being one of the commonest symptoms. Diarrhœa is usually set up, the excrement being at first dark in colour and frothy, later on greenish.

——**CRAMP.** Distortion of the feet and rigid condition, due to contraction of the muscles. This should not be confounded with mere loss of power (paralysis) known as "leg weakness."

——**IMPACTION OF CROP ("CROP BINDING.")** Food remaining in the crop becomes hard and distended. (*See* "Crop Troubles and Indigestion.")

——**DIARRHŒA.** Frequent evacuations of watery excrement. In simple diarrhœa it is merely dark and watery, but is greenish or yellow when due to a diseased condition of liver, and mixed with slimy matter or blood when due to inflammation of the bowel-enteritis. (*See* "Dysentery.")

——**DIPHTHERIA.** The membranes lining the mouth lose their natural pinkish colour and a whitish film spreads over them, and later on white spots appear, which gradually enlarge and change in colour to a dirty yellow. In some cases large clots of cheesy matter become deposited in the mouth and throat, giving off a very offensive odour. (*See* "Roup.")

——**EGG-BOUND.** Frequently going to the nest, walking with tail depressed, enlargement of the left side near the vent. In some cases a hard pointed substance, that is, an egg, may be felt in the left side near the vent. (*See* "Egg Organs, Diseases of.")

——**EMPHYSEMA.** The skin about the neck and front part of the body is puffed out like a ball. This affection is almost exclusively confined to chickens being reared in too close and warm a place.

——**ENTERITIS.** The symptoms of inflammation of the inner coating of the bowel are thirst, diarrhœa and usually straining, together with more or less prostration; but these symptoms are such as are met with in other diseased conditions.

——**FEATHER DISEASE.** The feathers on parts of the body of the subject become frizzled, and the quill part of them shrunken, and the skin at the roots of the feathers discoloured. As a matter of fact the diseased condition of the feathers is due to a diseased condition of the skin.

——**FEATHER EATING.** When fowls are bare of feathers and there are none to be found about their run, it is fairly certain that the missing feathers have been plucked and devoured by some of the fowls.

——**GAPES.** In addition to seeing the parasites—gape worms—the symptoms are gaping, coughing, sneezing and, more or less, difficulty in breathing. The only reliable symptom is seeing the parasite, because the symptoms—those of coughing, sneezing, and difficulty in breathing, together with gaping—are met with in cases of roup of the diphtheritic type.

——**HEPATITIS.** In cases of inflammation of the liver the subject is depressed and usually sleepy, and drinks a large quantity of water, but it is not possible to determine with certainty when a subject is suffering from the affection. (*See* "Congestion of Liver.")

——**INDIGESTION.** The symptoms of indigestion are the passing of undigested food, or food remaining in the crop an unusual length of time. (*See* "Crop Binding.")

——**LIVER DISEASE.** This term, except it be confined to tubercular disease of the liver, is very comprehensive, and the various symptoms of the affections of the liver will be found under "Congestion of Liver," and various other headings.

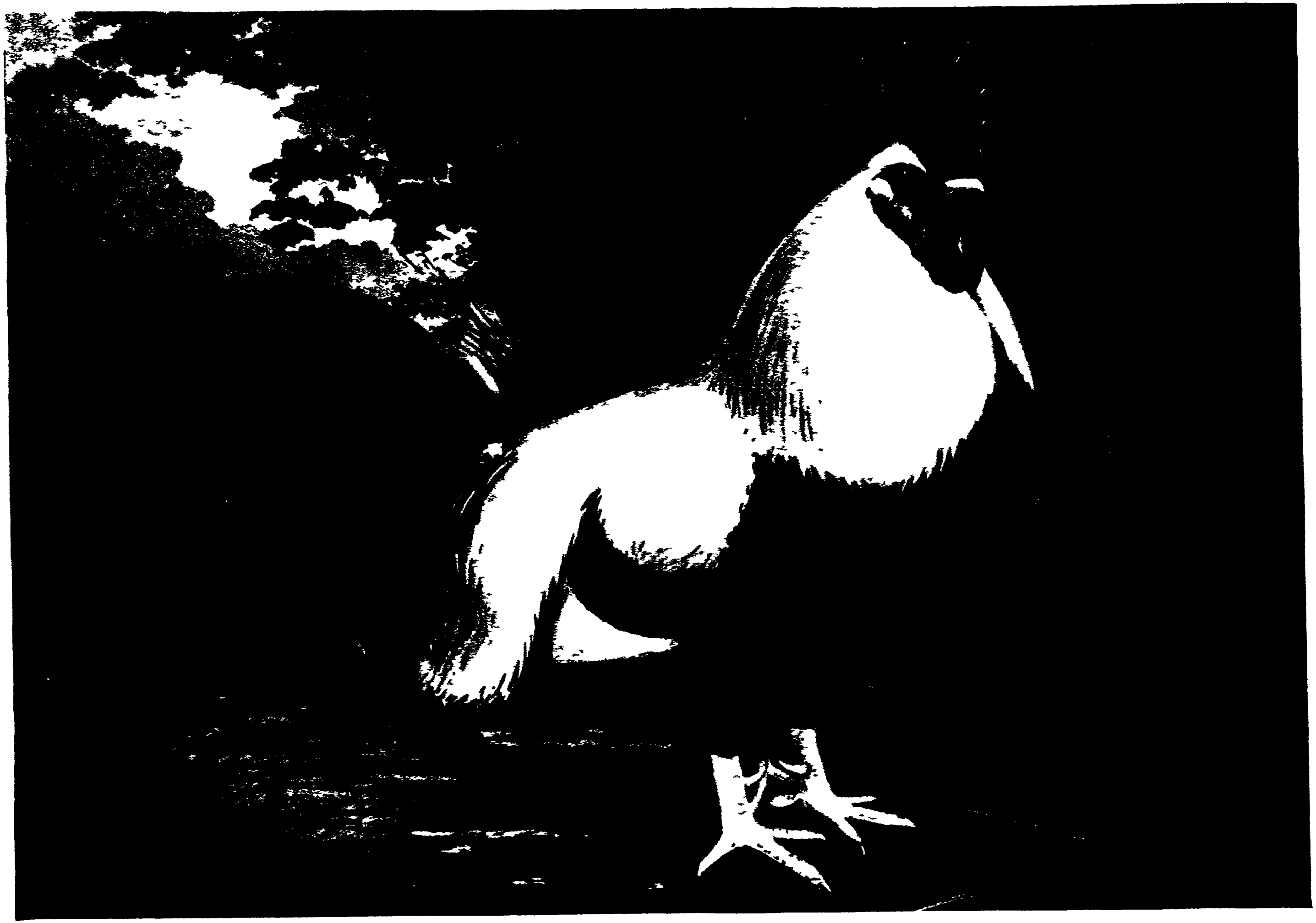
——**METRITIS.** In cases of inflammation of the oviduct the subject frequently goes on to a nest and may be noticed to be occasionally straining and, as a rule, has her tail depressed, and in some cases pecks at her vent. (*See* "Egg Organs, Diseases of.")

——**MOLLUSCUM CONTAGIOSUM.** This affection is usually known as "comb disease," or "fungoid disease," and is a scrofulous affection. The symptoms are wart-like growths on the comb, face or wattles, and occasionally on other parts of the body. When the growths are met with all over the body the affection is generally known as "small pox." (*See* "Combs, Diseases of.")

——**PNEUMONIA.** The most prominent symptom of inflammation of the lungs is, more or less laboured breathing, and in acute cases the subject heaves in a convulsive manner with every inspiration. In some cases there is a slight cough. In all cases the subject is depressed and

(*The Encyclopædia of Poultry.*)

PLATE No. 26



Silver Grey Dorking Cock.

(*The property of Capt Phipps Hornby Sandley House Gillingham, Dorset*)

Winner of 1st Crystal Palace 1st Birmingham 1893 1st and Cup Crystal Palace, and 1st Birmingham, 1894.

its head and body hot and usually dry to the touch.

——**PROTRUSION OF VENT-POUCH.** This affection is usually known as "down behind," owing to depression of the body of the subject in its hindermost part. The symptoms are the protrusion of a mass of membraneous tissue from the vent. (*See* "Vent, Diseases of.")

——**RHEUMATISM.** The prominent symptoms are stiffness in walking, swelling and redness of the affected joints, which are unnaturally hot.

——**ROUP.** The symptoms of roup of the diphtheritic type will be found described under the heading "Roup"; those of simple roup are the same as met with in cases of so-called colds. In addition, swellings take place underneath the eyes, in the wattles, and in some cases the comb becomes swollen. These latter symptoms are those of incipient tubercular disease. (*See also* "Tuberculosis.")

——**"SCALY LEG."** The symptoms are an accumulation of epidermic matter between the scales, with consequent enlargement of the affected legs and an inflamed condition underneath the scales.

——**SCROFULA.** The symptoms are those of roup of the diphtheritic type, besides composite deposits of cheesy and other matter in various parts of the body. The growths and deposits are usually of a yellowish colour. (*See* "Ulcerations and Sores.")

——**SEPTIC FEVER.** (*See* "Cholera.")

——**SYNOVITIS (BUMBLE FOOT).** An enlargement of the sole of the affected foot, and in advanced cases one or more of the toes become swollen, and also the leg, and swellings take place between

——**VERTIGO.** Inability to walk in a straight direction, turning round and round with head held in an unnatural position.

——**WHITE COMB.** In this case whitish coloured scurfy patches appear on the comb, face or wattles. These patches have map-like margins, which gradually extend over comb, head and face, and amongst the plumage. The feathers can be very easily drawn from the affected parts of the skin and the quill ends will be found to be covered with scaly matter. In advanced cases a very peculiar odour is given off from the affected parts. (*See* "Comb, Diseases of.")

DISINFECTION (*see* "Housing.")

DISPATCH, OF CHICKS (*see* "Day-old chickens.")

DISPATCH, TO MARKET (*see* "Marketing.")

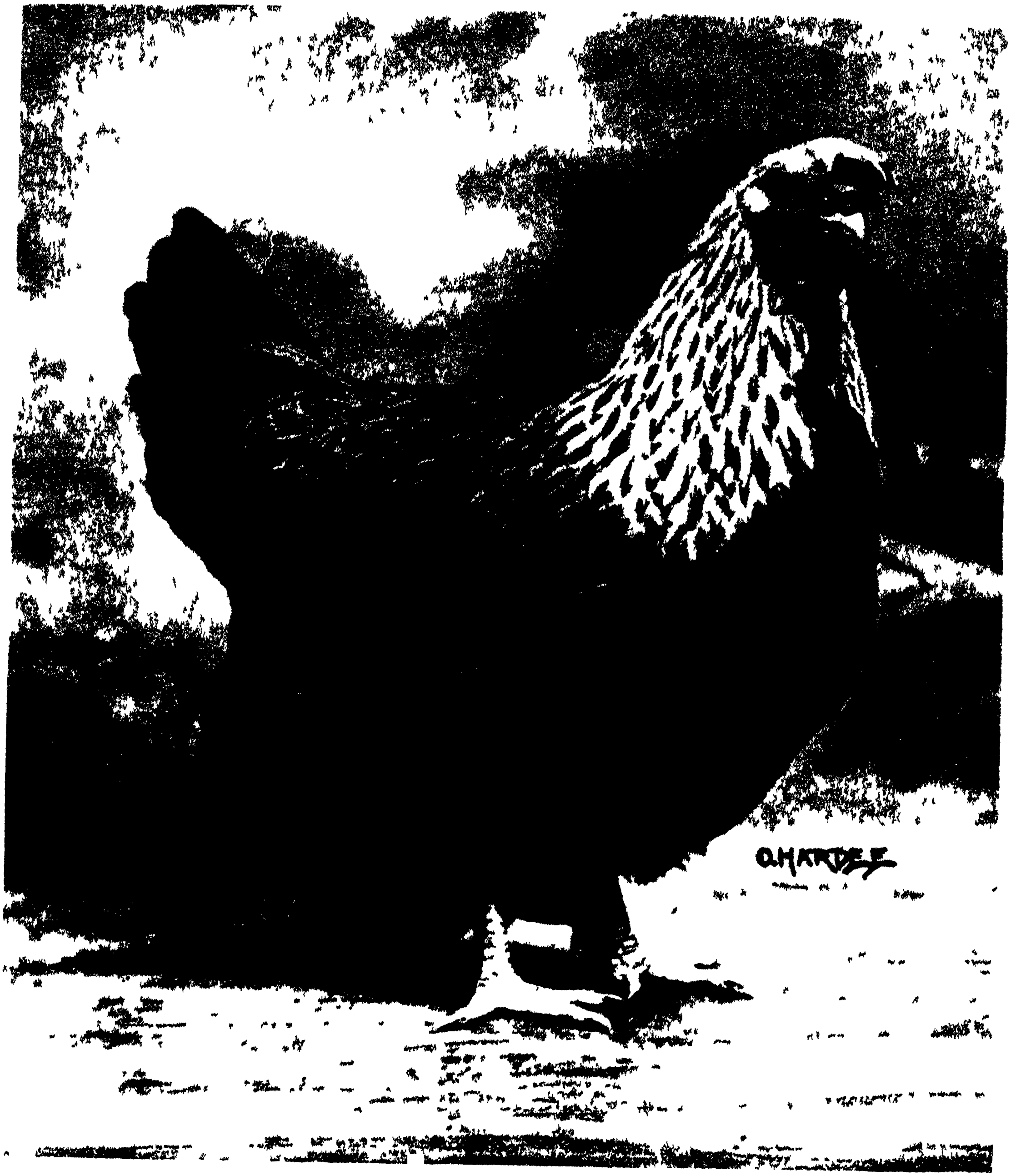
DISPATCH, TO SHOW (*see* "Shows and showing.")

DISTEMPER. A name commonly used for a form of roup (*see* "Roup.")

DOMESTICATION, RESULTS OF. The most important domestic species of birds belong to the gallinaceous order, including the common fowl, the turkey, the guinea fowl and pea fowl; and to the family Anatidœ, among the web-footed birds—such as the goose and the duck. Of most of them domesticated races exist which differ very considerably from those found in a state of nature, the variations being due to the modifying influences of the peculiar circumstances to which they have been subject in a state of domestication, as well as to the deliberate selection for various purposes at the hands of generations of poultry breeders. The origin and introduction of the various species into Europe is dealt with in the section devoted to "Origin," but it may be remarked here that modern breeders, who are inclined to be complacent regarding their achievements in the matter of new varieties, would do well to remember what credit is undoubtedly due to the old Eastern breeders, who have handed down such opposite types as the result of their selection from the original Jungle fowl. To them we owe the bases of the present-day variations, as regards type, colour and markings; and it is as well to bear in mind the useful qualities of the old breeds, and compare them with the degeneracy of some more recent productions. Although fancy breeders may claim to have shown the way, as regards selection and breeding for special purposes, utilitarians may boast the knowledge of the elements of artificial selection, by means of which all strains and varieties of domesticated fowls have been finally developed. It is by careful selection and breeding that desirable qualities are developed and the undesirable eliminated; and the most superficial comparison of modern domesticated fowls with their wild progenitors will suffice to show the great possibilities which exist in selection in the hands of experienced breeders. In the matter of selection by trap-nests, for the building up of a strain or family of egg producers, the evidence of records and competitions is most instructive, and the achievements of the future are all unknown, provided the strain-makers realize the limitations imposed by the necessity for the preservation of stamina and constitutional soundness in the selected breeders of such a strain. The advance in the production of table poultry is also very marked, and a comparison of some of the more suitable table breeds with the relatively small fowl of the Jungle is very instructive in this direction; nevertheless, it is not yet sufficiently understood, in this connection, that table qualities are just as hereditable as the powers of egg production, and that strain is as important in the one case as in the other. There are so-called laying breeds and table breeds, but the indiscriminate mating of one class may possibly be as inimical as in the case of the other. Apart, however, from details of breeding, there can be no question as to the remarkable development of both laying and table qualities, as the direct result of domestication and its modifying influences.

——**DEGENERACY.** Having admitted so much, it is impossible to ignore the retrograde tendency of some modern ideals, and to impress the necessity for some discrimination regarding the useful in present-day varieties, and the influence of some standards of breeding upon the older and one-time useful breeds. It may be admitted at once that the satisfaction of exhibitional requirements is perfectly legitimate in itself, but on the other hand, such a tendency has very unfortunate results as regards those who fail to distinguish between the aims of the two great classes of breeders—the fanciers and the commercial producers. As an example, we may consider the case of a novice who has read that White Leghorns are a useful type of laying fowls; yet, if he does not realize that recent exhibitional ideals have done much to destroy the old characteristic of the type, his initial efforts in egg production will be disappointing in the extreme. Provided the distinction is drawn between strain and breed no great harm is done, but so long as exhibitors dispose of their surplus stock for utility purposes, the evil spreads and multiplies to a disastrous extent; and not only is the purchaser disgusted with poultry keeping in general, but the fancy as a whole is blamed—through its own fault. There is room and opportunity for the development of both aspects, but the natural limitations should be mutually recognised, and the producer of colour or markings, or abnormal types should admit that other qualities are inevitably lost in the attain-

PLATE NO 27



Silver-Grey Dorking Hen.

(*Bred and owned by Mr Arthur C Major Ditton Langley Bucks*)

Winner of 1st and Cup Paisley 1st Special and Championship Royal Counties 1st, 3 Specials and Poultry Club Medal Tunbridge Wells 1st and Special Liverpool etc

ment of his particular ideal; just as on the other hand, the producer of a strain of egg-layers or table fowls must, without doubt to some extent, neglect the picturesque in breeding for his object. The mere fact of breeding as close as possible to complex external standards involves some loss of utility, inasmuch as it implies in most cases a too close method of in-breeding, with a consequent weakening of the constitutional hardiness which must go hand-in-hand with profitable production and reproductive fertility. The maintenance of purity in breeding is essential to the ultimate aims of both sections, but profitable and productive purity is seldom retained in fancy strains, and it is a well-known breeder's axiom that only the useful survives in the long run.

——**LIMITED DOMESTICATION.** Those who are at all acquainted with the extent and variety of gallinaceous and other birds with domestic possibilities, must at once be impressed with the fact, that the denizens of the farmyard and park by no means exhaust the list, and it is obvious that there are opportunities for the domestication of several others—mainly for utility purposes. In addition to the common domestic fowl, turkey, guinea fowl, duck and goose — the economic value of which has been long realized—there are others, such as the swan and the pea-fowl, which have long existed in a state of semi-domestication; and certain game birds, as, for example, the pheasant and the partridge, have rather been cultivated to some extent, than in any real sense subjected to the conditions of domestication. There are, indeed, degrees of domestication, even as regards the primary list, and neither the turkey nor the goose has been as fully developed under domestication as the common fowl, whilst the guinea fowl still retains more of its wild characteristics than either of the two last-named. The races found in domestication are, therefore, not only very limited, but in many particulars their possibilities are undeveloped and consequently unknown; in addition to which, there are others which would appear to be adaptable to the same conditions, and might possibly prove to be as profitable. Among the possible additions to the poultry keeper's existing list, the late Mr. Lewis Wright drew attention to the claims of the curassow, the guan, the tragopan, the goura, the primated grouse, and some others, of which it may be remarked, that the first named exhibits the greatest possibilities, that the tragopan has been bred in captivity, that the guan has been domesticated in South America, and that the goura has been bred in captivity in the East. In addition to the above, the talegalla of Australia or the brush turkey of New South Wales, which is the best-known species, would perhaps repay some attention at the hands of practical breeders. (*See* "Origin.")

DOMINIQUE (*see* "American breeds.")

DORKING. With this breed, as with many others, some colours stand the test of time while new colours come up and replace the old shades. To take this family through there are several colours:—The Red, Dark or coloured, Silver Grey, White, Cuckoo and the Rose-combed Dark. Though little known today, the Red is by far the oldest colour of the breed, and is probably the only one that has been kept pure from any outside influences. Their breeding centre is round Surrey and Sussex. Whether it is owing to the lack of interest by their present owners, or whether it is that they have gone out of favour, they certainly lose considerably in size, when compared with the other better-known colours. At the Palace show of 1908, a pair was exhibited in the "any other variety classes," and more than one fancier had to stop and ask their name. Apart from the legs, they looked like poor black-red Old English Game, though they were much smaller. All the Dorking family have five toes, and a clean white leg, right through to the toe nails, and these points count for much (when other parts are equal) in the show pen. The Dorking is undoubtedly the fowl that the Romans brought to this country at the conquest of Britain, and the colour that of the Red, for the early descriptions coincide with the bird to-day in every way. Essentially a table variety, the breed has stood the test of time in one colour or another, and though the Red is by far the smallest in appearance, they kill out well and give a fine, sweet, juicy meat. With a little enterprise the colour may be seen again on the show bench, and come into popularity much quicker than it went out. To describe properly the colour, one would call it a black-breasted red, while the hens are very much like the partridge Old English Game. They carry hardly so much feather as the Darks or Silvers, and hence are deceptive in appearance. It is necessary for them to have a single comb not too large, and clean, white legs and feet. Probably the oldest of the other colours is the White, and though in formation of body, legs, feet and quantity of feather they resemble the dark, the comb is a beautiful rose, worked in much the same way as the Hamburgh and with a clearly-defined leader, though not so prominent as in the breed just referred to. With a white leg and skin it is more easy to get a white plumage, and when these are shown in their best form they are all over quite as white as snow. As to their antiquity we find records of them as far back as 1815, and in general contour they were the same as those of to-day. In general appearance they are very handsome, for the whole is pure white with the exception of the head appendages, which must be a rich cherry red. There should be a wealth of neck and saddle hackle, the latter leading up to a very fine full flowing tail. It is regrettable that so few of them are being bred, for in all points they are far away the most handsome of all the white breeds of fowls. They are thought by some to be delicate, but when kept on well-drained light soil they prove easy to rear, and develop rapidly. When placed alongside of Dark birds, they appear smaller than they really are, so that anyone can be deceived on this point. Next in point of age comes the Dark, and though this colour was mentioned in early writings it is doubtful if they are as old as the Whites. It is more than probable that the old Surrey fowl played a large part in the formation of the Dark Dorking, and also that the actual colour then was much lighter than we know it to-day. It was from these that the first Silver Greys came, and were lighter colours from the one parent stock, though no doubt since other breeds have been infused into them to give more distinctive colour, such as the clear neck and saddle hackle. In general appearance these two colours are much the same, although in size a little must be given to the Darks, which as a whole are larger than the Silvers, yet at the same time a few monsters are found among the latter colour. The comb of each should be single, and while fair proportions are needed the great tendency is excess of the head gear, which is then inclined to fall over, a bad fault in the variety. The shape of the body should be as near an oblong square as possible, and this can only be obtained by keeping all the breeding stock very deep and square in the breast. In the Dark cocks white in wing or tail is a fault, the same as in the hens, and the females should be of a rich dark level colour, free from shaftiness or harshness of colour. The breast of both must be sound black in colour, free from any tickings of white or brown, a part which is shown up in the Silvers by the silvery white neck and saddle hackle. The Silver hen must be of a nice soft shade of colour, free from any mossiness; not an easy thing to get in old hens, but found in pullets of the first year's showing. The combs of the hens are inclined to go over a little, a point not considered of special note. Other things being equal, the preference would be given to a good combed bird. Size in all Dorkings plays a most important part, and if the shape is correct, colour is of secondary value. The white legs and feet are made much of, and some judges will even leave out birds that have dark toe nails. One other colour of the Dorking family, though not much known, is the Cuckoo. The actual title should be, no doubt, the Barred, for an attempt was made to produce a bird much like the Rock in barring though rather darker in colour. Only seen occasionally, and then at the largest shows, they have never caught the fancy and remain very much in the background. The last of this family is the Rosecomb Dark, and the name fitly describes it. Both these latter colours should have the proper character and the same points in legs and feet, and the Cuckoos have a rosecomb as in the Whites. (*See Plates Nos.* 26, 27 *and* 28.)

DOUBLE MATING (*see* "Mating.")

DRAKE. A male duck.

DRESSING POULTRY (*see* "Marketing.")

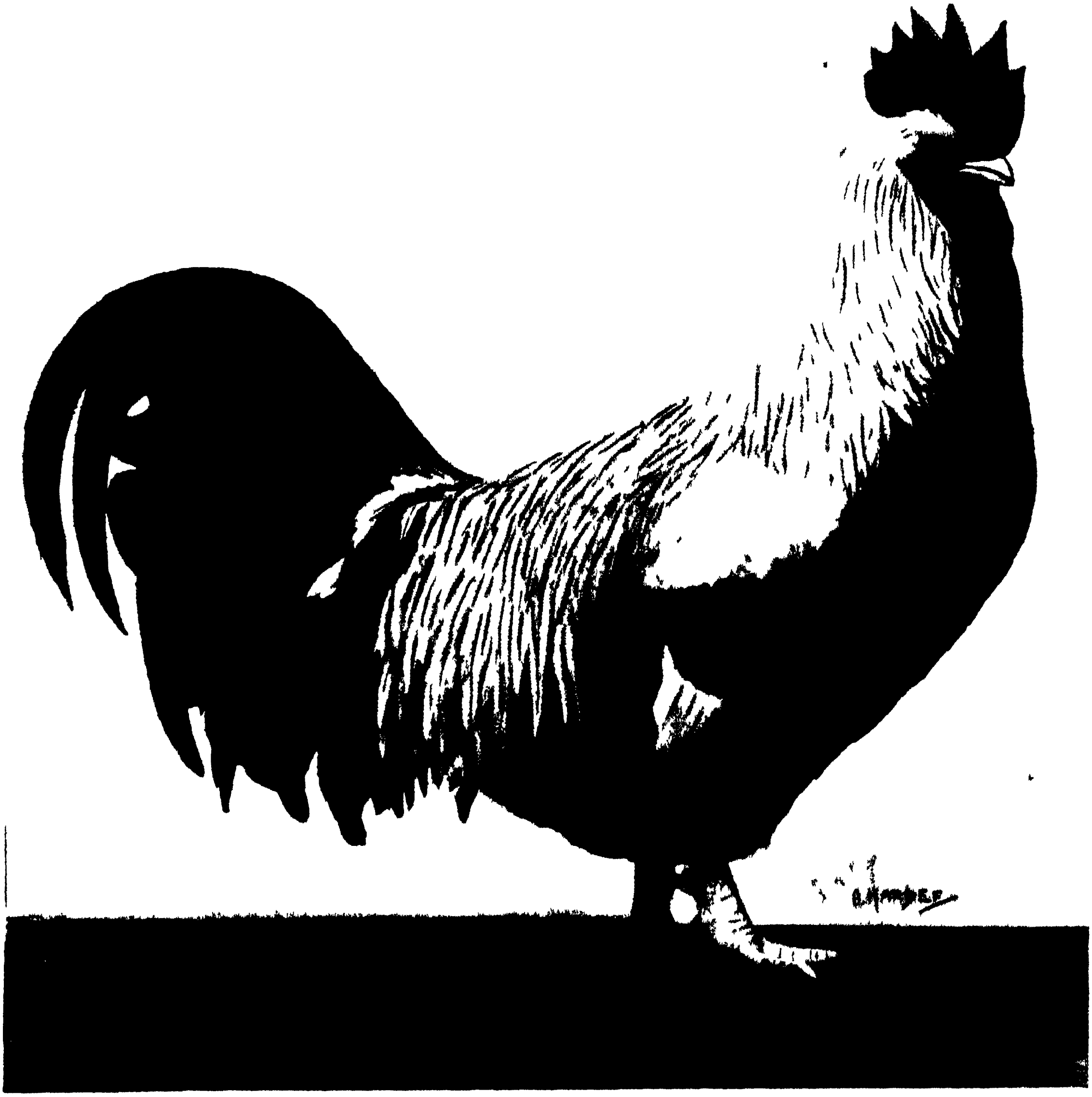
DRINKING VESSELS (*see* "Water supply.")

DRY-FEEDING MIXTURES (*see* "Feeding tables.")

DRY SYSTEM OF FEEDING CHICKENS. Until about the year 1903 or 1904, the method of feeding young chickens in general vogue in this country was not altogether satisfactory, particularly in the case of those artificially hatched, and in places that were at all low-lying or damp, a considerable difficulty was often experienced in rearing to maturity anything like a really satisfactory percentage. The dry method was introduced four or five seasons ago from the United States, where it had been practised for several years previously with the most excellent results. Upon its first introduction into England it met with a good deal of opposition, but it has now passed beyond the experimental stage, and, owing to the many and great advantages it possesses over the older method, it is being adopted by poultry keepers all over the country. It does not matter whether one rears a dozen or a thousand chickens in the season, the advantages are the same, and after trying both systems for several years past there are hundreds of practical poultry keepers up and down the country, who are strongly in favour of the new or dry method. The disadvantages of the moist system—so-called, in contradistinction to the dry—are many. In the first place, constant labour is involved in preparing the food during the first few weeks of the chickens' lives, as it is necessary to give it warm and fresh every few hours; difficulty is almost invariably experienced in persuading the youngsters to take exercise, so necessary a factor towards health and vigour; mortality early in the season, especially in cold or damp situations, ranges high, and the actual cost of the various ingredients is by no means low. All these difficulties are overcome by adopting the dry system, which consists in only supplying a mixture of grains during the first month of the chicken's existence. Up to the age of a month, hard grain only is supplied, for which the chickens have to scratch. The floor of the coop or brooder is covered to the depth of three or four inches with straw-chaff, among which the mixture of grains is scattered. In this manner the chickens have to be constantly hard at work, and this is undoubtedly the main reason why the system is so very successful. Instead of the chickens standing idle the whole day long they are always busily employed, and very soon learn that if they do not work hard they have to go hungry. Once every day, or at the most twice, sufficient grain is thrown down to last the birds until the next time of feeding. Only those who have actually tried this system can realize what an enormous saving of labour this represents. Whereas, under the moist system a man could attend to, say, a thousand chickens, under the dry system he can in the same time look after treble the number.

Some breeders attach a great deal of importance to the exact mixture of grains employed, but as one cannot ensure the chickens eating the right proportion, it is difficult to see what good purpose is served by devoting time and labour to the preparation of a mixture containing just the right amount of albuminoids, carbo-hydrates and fat. There are some very excellent mixtures on the market, some of which are quite cheap, but for some reasons it is advantageous to prepare the mixture oneself, as in this manner one can vary the grains as thought necessary; moreover, even buying the grains in small quantities it works out rather cheaper than those offered for sale. A mixture that may be very strongly recommended consists of the following :—Three parts of wheat, two dari, two pin-head oatmeal, two canary seed, two millet, one maize,one buckwheat, one rice, one grit, and one meat. Counting one part as seven pounds, the above works out exactly to one cwt. Buying the grains in small quantities the price of the mixture averages about 10s. 6d. per cwt. The wheat and maize require to be cracked, as whole they are too large to be properly digested. A distinction must be drawn between cracking and grinding, as the latter must be avoided. Grains alone should be supplied until the chickens are a month old, but it is unwise to continue this diet any longer, because, unless soft food is supplied, they experience considerable difficulty in feathering, besides which development is retarded. It is found that when two meals of mash are provided daily the feathering process is greatly hastened, the birds seem stronger and more vigorous, and they ultimately attain a larger size. After the long fast of the night they need something that can be quickly assimilated, because the crop and intestines are quite empty, and soft food supplies this need much better than hard grain. The soft food may consist of several different ingredients, but whatever is supplied, should be in a crumbly-moist condition, rather than sloppy. While it requires to be thoroughly swollen out, it should be fairly dry, because sloppy food is very liable to cause diarrhœa and other serious bowel complaints. One of the specially prepared cooked foods is excellent, and has the advantage of being ready for use with very little preparation; nearly all of them, moreover, are easily digested and very nutritious. To provide a variation in feeding an occasional meal of ground oats, middlings, or barley meal, moistened with skim milk or warm water, should be supplied; boiled rice is also a very excellent preparation, one of which the chickens are extremely fond, and upon which they thrive particularly well. The mixture of grains recommended for use during the first month of the chickens' lives is too expensive after this period has elapsed, and a considerably cheaper preparation should be employed. The following is one that gives satisfactory results :—Three parts of wheat, dari, and maize; two parts of meat and buck-wheat; one part of millet, linseed and grit. Counting one part as seven pounds, the above works out to exactly one cwt. The wheat and maize should be cracked, as the chickens are too young to digest them whole. The linseed is a very important ingredient of the mixture, as it greatly assists in the formation of feathers; the few weeks the chickens are obtaining their new plumage is a somewhat trying period, and they require

PLATE No. 28



Dark Dorking Cock.

(*Property of Mr. Arthur C. Major, Ditton Langley, Bucks.*)

Winner of 1st and Medal Dairy, 1st Crystal Palace, and 1st Birmingham, etc.

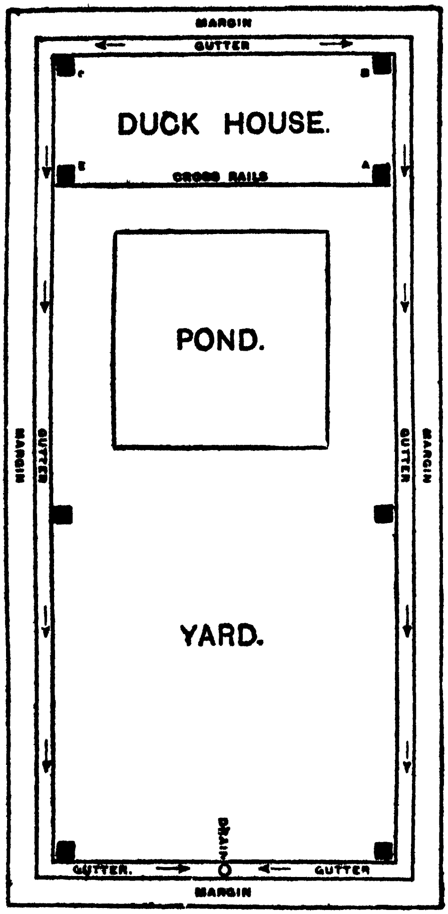
special attention at this stage. Green food is always necessary for young chickens, but especially is this the case when they are being fed entirely or mostly upon grains, as without a plentiful supply they do not thrive nearly so well, and the system of feeding will probably prove unsuccessful. There is nothing better for the purpose than lettuces; when they are scarce the tender leaves of cabbages, boiled stinging nettles, or, in fact, any tender green stuff answers well. A liberal supply of drinking water should at all times be available for the birds, which, during warm weather, should be renewed two or three times a day. A drawback to this method of feeding is that it lends itself so readily to waste. Unless the greatest care is exercised, a large proportion of the grain will be thrown away when renewing the chaff. It should be a strict rule when this method of feeding is adopted, never to scatter any more grain until the whole of the old supply is exhausted.

DUBBING. The process of cutting off the comb and wattles of game birds; it was instituted in the times when cock-fighting was in fashion, to prevent the serious results arising from injury to these organs in the contest.

DUCKLING. A young duck.

DUCKLINGS FOR MARKET (*see* "Aylesbury Duck industry.")

DUCKS. MANAGEMENT AND BREEDING OF. In the English districts where the production of ducklings is undertaken upon any sort of extensive commercial basis, the work is divided between two classes of producers, the breeders and rearers; and although in the case of limited output, the disadvantages of this method would out-weigh the advantages, the usual division is followed in this work as far as the arrangement of subjects is concerned, and, whilst this section deals entirely with the management of breeding stock, the reader is referred to the section "Rearing Ducks" for information regarding the other branch. The extent of individual production must necessarily depend upon such local considerations as markets, demand, and facilities for transit; but the success of the actual breeding operations naturally depends primarily upon the physical characteristics of the immediate neighbourhood and holding, and their suitability or otherwise for that particular branch of poultry work. Although ducklings may be very well reared, for marketing purposes, in a variety of situations and in very confined quarters, it is altogether different as regards the stock birds kept for breeding; and the poultryman will early discover that poultry of all descriptions will not thrive equally in a given place, and that a good situation for fowls or turkeys may be a very bad one for the well-being of ducks stocked for breeding. As a rule, it is found that the production in question, is best carried on in sheltered valleys rather than on exposed uplands, and the most suitable soil is that which is light and gravelly; the advantages of such a situation are considerably enhanced by a running stream, lake or sufficient expanse of clean water. As a general proposition, it may be stated that all waterfowl kept for breeding purposes should have free access to swimming water, and although the eggs of Indian-Runner ducks are fertilized without this advantage, the safe rule is to admit no exception where strongly fertilized eggs are required to be produced. The well-being of any fowl depends to a great extent upon contentment, and the satisfying of natural requirements, and the optional use of water is natural to all waterfowl in a greater or less degree; moreover, the subjecting of parents to artificial conditions must in some measure tend to degeneracy in the off-spring. A grass run and a pond must, therefore, be regarded as the minimum of the essential conditions, but the free range of pasture land and access to running water is always preferable, although, for the accommodation of most varieties the land should not be swampy, but good sound grass-land, bordering a stream. The next consideration is shelter, other than that of houses, and the most perfect is such as is afforded by the foliage of waterside trees and shrubs; a considerable proportion of loss experienced by duck breeders is due to the neglect of this simple requirement, and the consequent exposure of the birds to the unbearable heat of the sunnmer sun. There are comparatively few farms which could not be in some part made adaptable for the accommodation of breeding ducks, but in no circumstances should these birds be placed upon a closely fenced pond, as is sometimes done, without the inclusion within the boundary of a sufficiency of grass and sheltering foliage—unless the pond is a large one surrounding a suitable island. Except the running stream be small it would be necessary to provide against the carrying or swimming away of the birds, and a simple expedient is to dig out a shallow in the bank and fence it off from the main body of water—as may very well be done by closely-driven stakes, bound together by light poles nailed along the top.



Plan for Construction of a Duck Yard.

The housing and nesting quarters for ducks must be considered quite apart from the accommodation provided for the other feathered stock—all descriptions must be housed separately. It is of the first importance that the ducks' house shall be perfectly dry, because, although these birds are waterfowl, nothing is more directly harmful than to house them where they will be subject to damp conditions; whatever form of construction is adopted it must be sound as regards roof and sides, and the floor removed from the reach of water. The situation is immaterial, but a position near the water is most generally convenient; so that it may be built on high and well-drained ground, erected on piles at the edge of the water, or may be an ornamental floating structure—although for practical purposes the latter is not advisable. For the use of ordinary farm stock it is sufficient to place an ordinary poultry hutch in the most convenient and suitable place, but if the stock is large, it is preferable to use several small houses rather than to herd them all in one large one. The ventilation must be ample, and the interior should be cleaned daily, and fresh dry bedding provided frequently.

In stocking for any object, and with any breed, health must be the first consideration—unhealthy birds have no place in the breeding pen; and speaking generally, preference should be given to large-boned birds of good average size and length, that are vigorous and active—but very large or heavy specimens are undesirable for the purpose, especially in the case of a drake. If the selection is in view of the production of ducklings for table, this rule still holds good, because a suitable stock of medium size will produce birds quite capable of considerably exceeding the weight of their parents if the feeding and management is correct; but a selection for the breeding of a progeny approximating to some exhibitional standard of a pure breed involves many other conditions, relative to colour and markings, and necessitates some amount of experience in that direction before success can be assured.

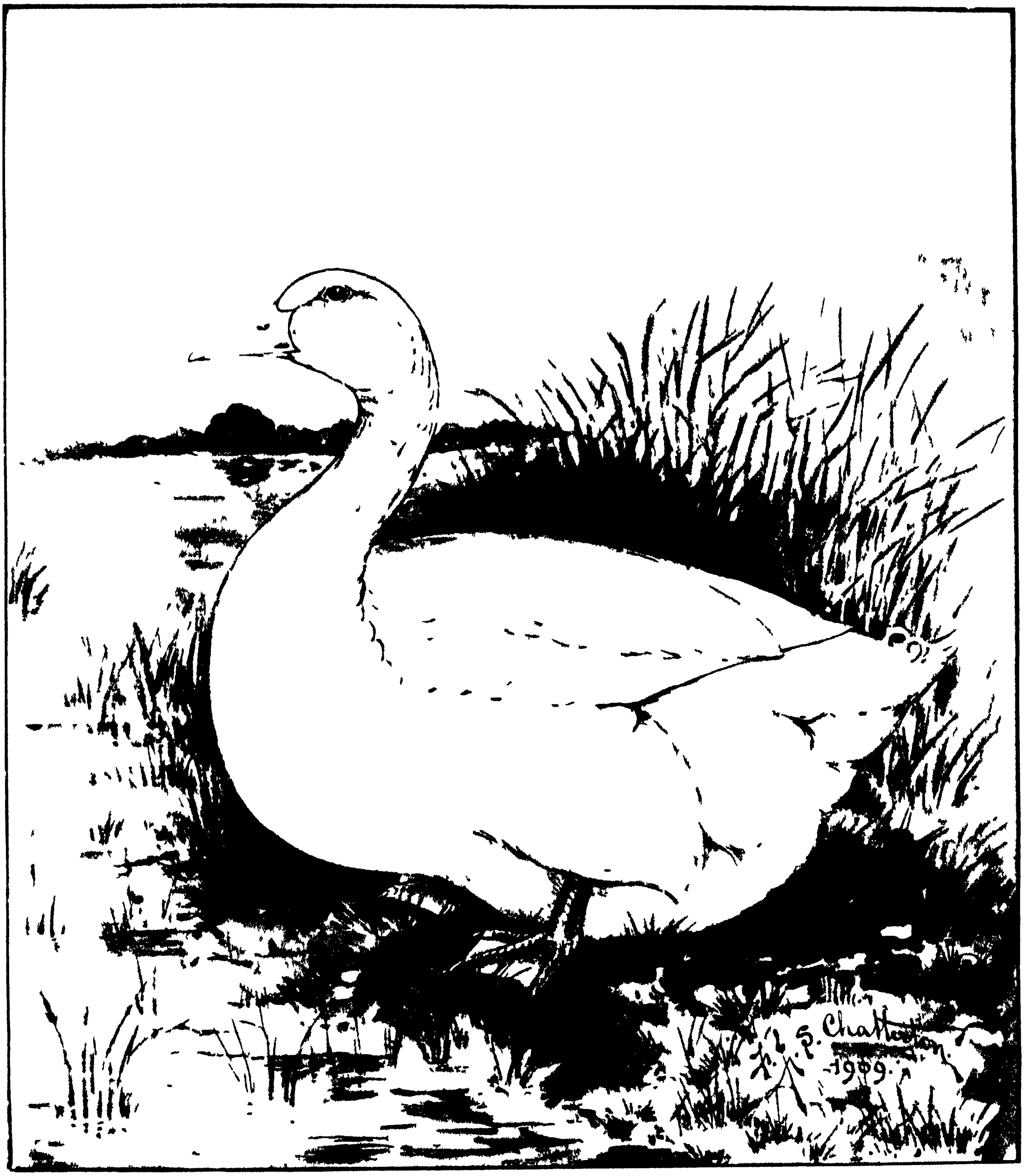
The proportion in which ducks may safely be mated with a drake depends upon many more or less individual circumstances, but for the production of a high percentage of fertility in the eggs, the safe course is to mate the birds in pens of one drake and two ducks, or two drakes and five ducks—although the number of ducks may generally be increased, a course to be decided by the breeder who has experience of the birds and their results. In order to maintain a suitable vigour it is best to use unrelated, or at any rate very distantly related, drakes; and any approach to in-breeding usually has a disastrous effect upon the progeny. Although many practical breeders invariably mate young birds upon both sides, the best table ducklings for ordinary use are those produced from the mating of a second year drake with ducks of the current year's early hatching—which latter would average about eight months of age at the time of autumn mating, *viz.:* at about October. Cross-breeding is largely resorted to by duck breeders, with whom favourite crosses are between Aylesburys and Pekins; or for early ducklings, many cross the Indian-Runner with the Aylesbury, and some again recross the cross-bred ducks with a pure-bred drake.

The correct feeding of the breeding stock is a matter of great importance, involving due recognition of the fact that, although these birds are very large eaters, they also require a sufficiency of nitrogenous food for the purposes of fertile egg production; considerations that are limited by the necessity to avoid forcing on the one hand, and fattening on the other. For general use in open weather a suitable soft food mixture would include oatmeal, middlings, and a small quantity of meat in some form; and for grain feeding at night, wheat and oats may be used alternately. In sharp winter weather barley meal may take the place of the oatmeal in the soft food, and a limited quantity of small flat maize may be given at night; but the use of the latter must be sparing, or the birds will become too fat, and if barley meal and meat are fed too freely, there will be a risk of causing ovarian troubles. The supply of green food must be regulated according to the state of the natural supply, and a supply of sharp flint grit must be always accessible. When the birds have the freedom of a good range two meals daily will be sufficient for their requirements, and in cold weather the morning mash should be given warm—but not hot. At the commencement of laying a sharp watch must be kept lest the ducks develop the habit of dropping their eggs in the water when swimming, and it is sometimes advisable to confine them a little longer in the morning to ensure getting the eggs—these birds usually laying quite early and not so indiscriminately as fowls. In the matter of incubation, the choice practically lies between domestic hens and incubators, it being very unusual to allow ducks to incubate their own eggs; and the majority of breeders prefer to set them under hens, although the use of the incubator is increasing—especially upon some of the modern duckling producing farms, where the numbers reared would be quite beyond the capacity of the hens ordinarily available. When using the domestic hen for incubating ducks' eggs, the nest should preferably be upon the earth, which it may be necessary to moisten round the actual nest in very warm or dry weather—but there is no necessity to damp the earth under the nest or to sprinkle the eggs. During the twenty-eight days required for the incubation of these eggs, the hen should be managed as usual in the case of sitting hens. When the incubator is used it should be operated as when filled with hens' eggs, except as regards moisture and air supply, regarding which some experience is necessary—ducks' eggs require more moisture than hens' eggs when in a machine, and the supply of fresh air must be ample. At hatching time, if the conditions have been suitable, no interference with the eggs should be necessary; unless in the case of a chipped egg the lining membrane is found to be very dry, when it may be very slightly torn. The eggs selected for incubation should be normal as regards shape and size, and must be tested before a strong light at about the tenth day of incubation—the infertile and addled being removed. (*See* "Rearing.")

—AYLESBURY. The Aylesbury duck rightly occupies the most prominent position in relation to other domesticated varieties bred for economic purposes, and with English producers at least it is as popular as it is useful. Its utilitarian importance is primarily due to its adaptability to the requirements of the early duckling trade, inasmuch as the young birds are more capable than those of any other breed of attaining to considerable size and weight at a very early age, added to which the quality and flavour of the flesh is excellent. These distinctive economic qualities are doubtless due to the evolutionary selection so long practised, for the one main purpose of early marketing, by those engaged in the Aylesbury duckling industry; the breed having taken its name from the district of the industry, which would of itself be sufficiently suggestive, without any contributory evidence, as to origin—although the fact must not be ignored that it was once known as the "White English" duck.

This breed, or rather sub-breed of the common domestic duck, appears to have originated (as we know it, which is sufficient for our purpose) in the fertile Vale of Aylesbury, in the centre of Buckinghamshire, away from which neighbourhood it was long considered impossible to rear it to perfection; this theory has, however, given way in face of the very material evidence produced by breeders in far distant localities and amid very different surroundings. As a matter of experience, Aylesbury ducks are very easily acclimatised, and have been proved to meet all reasonable expectations in situations where other breeds of waterfowl have failed. With regard to their external points of perfection, from the exhibitional standpoint, it was originally held that the peculiarly characteristic pinkness of the bill was impossible of retention away from the sandy gravel of the streams of Aylesbury, to the action of which it was primarily attributable; it has, however, been found possible to retain the desired colour, and to avoid the yellow tinge, by the exercise of proper care. The character of the water and the soil are the chief influences in this particular, and the colour of the bill is also affected by the direct rays of the sun, and the constant running of the birds upon meadow land—all of which is very immaterial from the point of view of the commercial producer, who is more interested in the fact that, in addition to table qualities, the breed is capable of producing excellent

PLATE No. 29



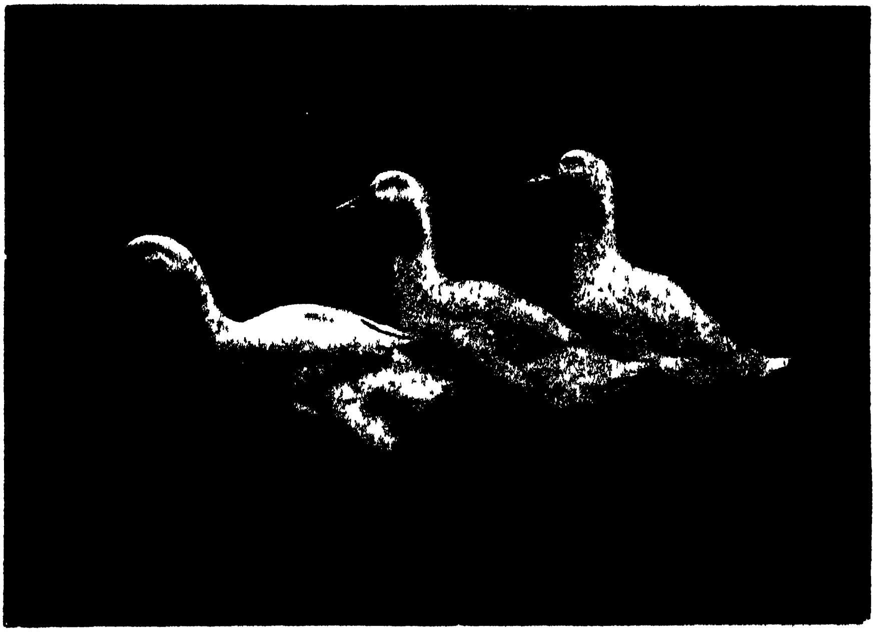
Aylesbury Drake.

(*Bred and Exhibited by Mr Thomas Abbott, Wymondham Norfolk*)

Winner of 2nd Prize Crystal Palace (International) Only time shown

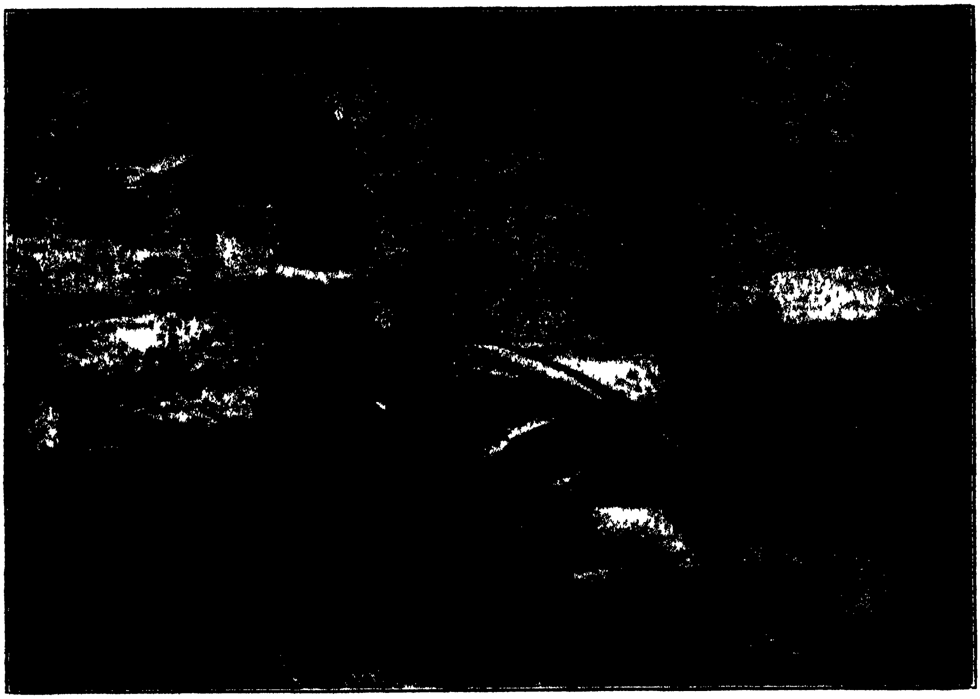
laying strains, producing eggs of large size.

There is only one variety—the white, and the plumage should be spotless; any deviation from the purity of colour throughout is a blemish, and probable evidence of impurity of breed. Except for the curled feathers of the drake's tail, and his relatively greater size, the general characteristics are similar in both sexes. Both bill and head are long, and the former a more or less straight continuation of the latter; the bill is comparatively broad, and the head large. The neck is long and not very thick, the breast prominent, the keel deep and long. The breadth and length of the back is a marked feature, as is the shortness of the tail and its slightly upward tendency. The wings are long, compact, and closely knit to the sides; the legs are short and broad, and the toes straight and well webbed. The colour of the bill has already been referred to, and that of the shanks and feet is a bright orange. Adult drakes sometimes weigh as much as about nine to ten pounds, and ducks about eight or nine; but more ordinary weights are seven and six pounds respectively, and for breeding purposes excessive weights are very undesirable, provided there is a good and well-developed frame. The colour of the eggs varies considerably, and ranges from a pure dead white to a bright green, a fact never satisfactorily accounted for, but of no apparent practical importance. The main exhibition points, in their order of importance, are: size, contour of breast and keel, shape of head and bill, condition, colour, and general symmetry. (*See* "Aylesbury Duck Industry"; *also Plates Nos.* 29 *and* 30).


Pen of Aylesbury Ducks.

— — **ROUEN.** The plumage of this variety bears a remarkably close resemblance to that of the wild duck, or mallard, and undergoes the same peculiar changes in summer. A usual result of domestication has, however, tended to considerably increase its bulk and weight, at the expense of its original symmetrical grace of carriage. It has been claimed for it that scientific breeding has caused it to surpass in beauty of colouring its wild progenitor, which is, of course, a matter of opinion; but one with which many will not agree, although duly admiring the result of the breeders' art. Surely, no art can improve upon the natural plumage, plus the symmetry, of the mallard ! Economically, the improvement of domestication has, of course, been very great.

Exactly why this domesticated variety, which is so like and yet unlike its wild ancestor, should be designated the Rouen does not satisfactorily appear. There are several old-standing explanations, all of which are more or less laboured. The geographical significance of the modern application of the name Aylesbury to the old White English variety is sufficiently apparent, as we have seen ; but there is no similarly obvious reason for connecting the Rouen duck with the capital city of the department of Seine-Inférieure. The best that can be said in support of the argument is that the neighbourhood abounds in water-fowl, and that Normandy is a celebrated poultry-producing province—which is scarcely conclusive evidence. Others contend that the correct name should be "roan" (Fr. : rouan), in reference to one of the many colours of the plumage ; although why that particular colour should have been selected is not explained. The derivation of the name, although a cause of dispute, is after all very immaterial for all practical purposes ; and whilst we may leave the solution of the mystery to others, we may safely conclude that the variety is a direct descendant of the Mallard. Apart from other essential indications, the evidence of its plumage would almost preclude discussion on that point.



A typical Rouen Drake.

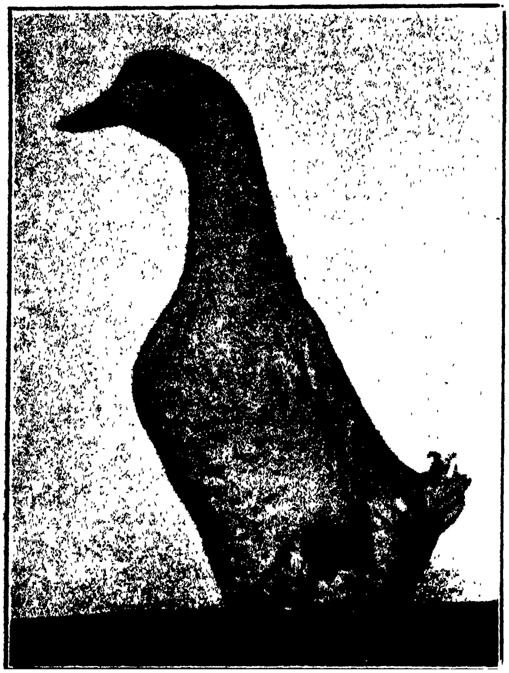
Apart from colour considerations, the characteristics of the sexes are similar. The head is large, with a long, wide bill, in an almost straight continuation. The neck long and curved. The body massive, as regards depth, width, length, squareness of keel, and fulness of breast. The wings large, and the legs stout and of medium length. In well-grown birds the body should run parallel with the ground, and although low down, should clear it at all points. Well-matured ducks weigh nine to ten pounds, and drakes ten to eleven pounds.

The colours and markings of the drake are :—Bill, greenish-yellow, with a black tip ; eye, hazel ; head and neck, green ; well-defined collar or ring of white. Below the collar the breast commences, and is of a claret colour—from shoulder to shoulder, but not at the back of the neck. The colour of the underparts is grey, running into black below the tail. Tail coverts, brownish-black ; and the curled tail feathers, green-black. Back, green-black. Wings, large coverts, pale grey ; small coverts, pencilled grey ; pinion coverts, dark grey or black. Wing bars, broad bands of bright blue, with narrow edge-bars of first black and then white ; flights, brown-black. Shanks and feet are variously described as a bright orange, or a bright brick red.

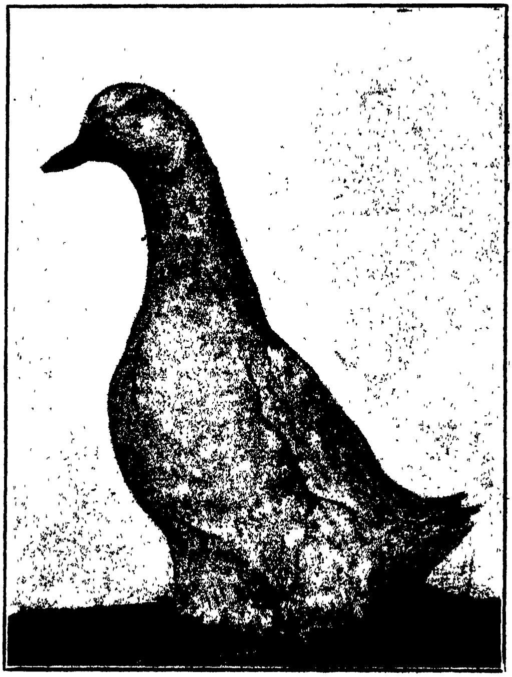
The colours and markings of the duck are :—Bill, brownish-orange, with black tip ; head, golden chestnut-brown, with dark lines across. Neck, similar to head, with a brown line at the back, from the head to the shoulders ; but no collar or ring. Breast, pencilled brown ; back, a lighter brown with black-green pencillings. Under parts, grey-brown, with dark pencillings. Wing bars, blue, and marked as in the drake. The main exhibitional points are (in the order of importance), colour, size, symmetry, and condition, as regards drakes ; whilst for ducks, the pencilling and ground colour are of importance, followed by the other considerations.

Apart from the beauty of its plumage, which is responsible for some demand for the stocking of ornamental waters, and the relatively dark tones of its colouring, which renders it suitable for keeping in proximity to towns, and in situations where a white breed would become unsightly, the Rouen is possessed of valuable economic qualities, which make it very satisfactory for the general purpose of farmers and others who are not primarily interested in early duckling production. For the early trade it cannot in any way compete with the Aylesbury, which it in no way equals as regards early maturity ; not only is it less precocious, but it does not fatten readily in the duckling stage. It is, however, one of the largest breeds kept in domestication, and although its capacity for attaining a considerable size is incompatible with a quick development and early maturity, it is especially suited for growth into size for autumn and winter fattening and marketing, in which branch of production it is probably unequalled, and for which it is chiefly used. The fine quality and abundance of the flesh, and its excellent full flavour, renders it fitting for table purposes, whilst it furnishes good material for the formation of laying strains. It does not, however, as a rule, commence laying so early in the season as the Aylesbury, although with good management eggs should be procurable at the end of December ; it may be classed as a good winter layer, producing, under suitable conditions, a high percentage of fertility. As a rule, the females are good sitters. Judging by its career as a show bird, the Rouen (although originally inferior in size) many years ago not only equalled, but surpassed, the Aylesbury in weight, and for some time regularly supplied the heaviest specimens ; but latterly in many instances the colour and markings have been considered rather to the disadvantage of size, which is a natural tendency with exhibitors of such a breed. The Rouen will, however, breed sufficiently true to type for all purposes of the farmer who, untrammelled by the details of a standard of perfection as regards feathering, will find in this breed his best material for the production of large birds at the least cost for the end of the year demand. The breed is hardy, easy to rear, and active in foraging. The season for which Rouens may be bred practically extends from July to February.

——**PEKIN.** Next in order of utility may be placed the Pekin, a variety differing from all others in shape and carriage, and which on account of its peculiar upright gait (so unusual in ducks) has been compared to the Penguin—although it is perhaps equally suggestive of the Puffin. Beyond the fact that it was first brought into this country in 1872, very little is known of its history. It was, as the name suggests, imported from China, a country of whose ornithology our knowledge is very imperfect. We are, however, indebted to the Chinese for other varieties of waterfowl and gallinaceous birds, and whatever may have been the origin of the Pekin duck, its great prolificacy is of itself sufficient proof of its long domestication. It is perhaps chiefly on account of its laying powers that English producers will find it of use, its table qualities (for their purposes) being inferior both to the Aylesbury and the Rouen. Breeders of early ducklings have also used it to some extent as a cross with the Aylesbury, by which means it has been found possible to produce a somewhat larger progeny—probably owing to some neglect in the previous breeding of the native breed, and the needed impulse of fresh blood; its chief use in this connection has possibly been to increase prolificacy.



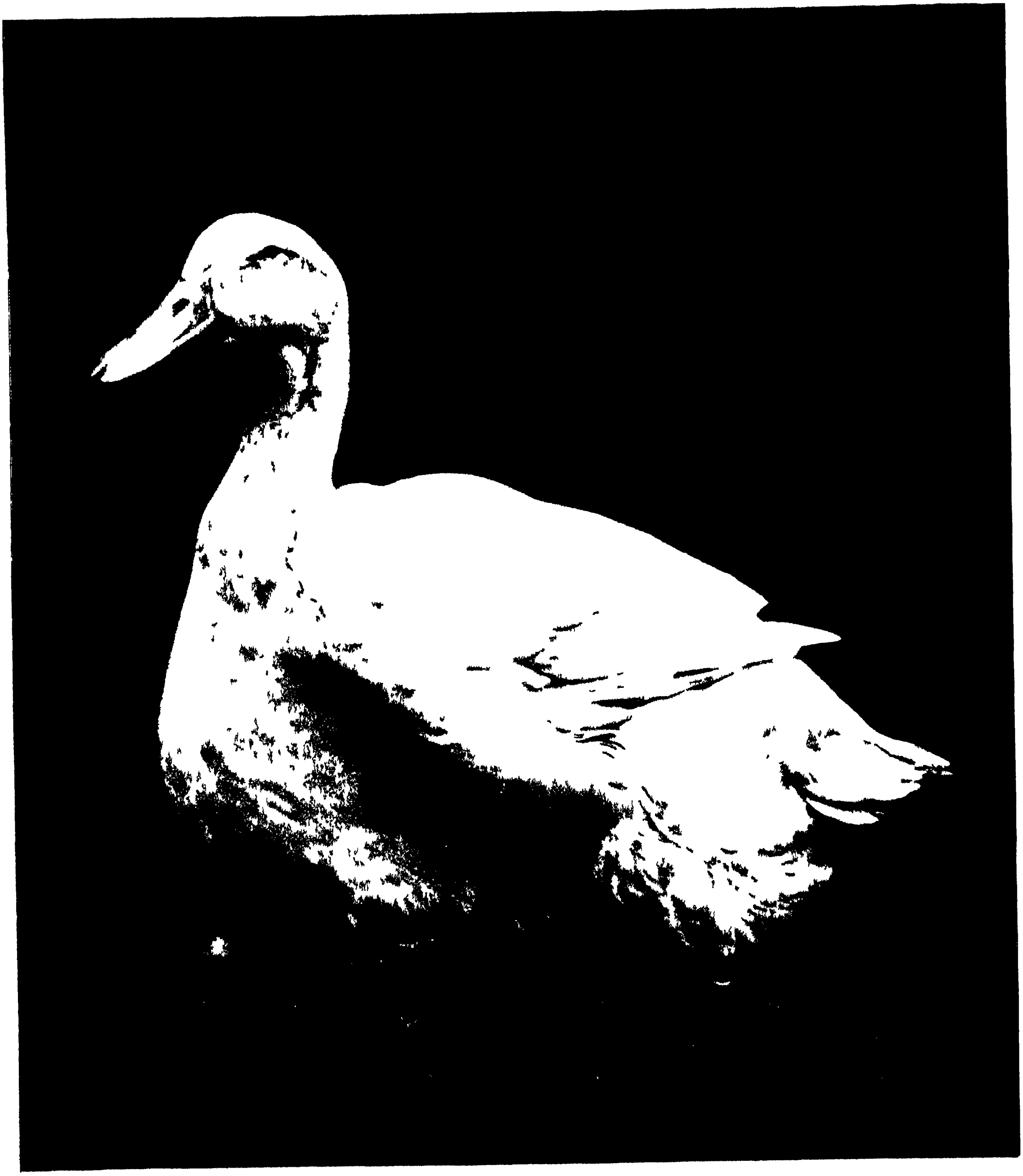
Pekin Drake, 1907.
Breeder and Exhibitor, Clifford D. Milne, Whaley Bridge, Derbyshire.
Winner 1907 1st Dairy, Norwich, Altrincham; 2nd York, Manchester, International and Leeds, 1908.



Pekin Duck, 1908.
Breeder and Exhibitor, Clifford D. Milne, Whaley Bridge, Derbyshire.
Winner 1st Dairy, Altrincham Club Show, Manchester, Worsley, Hope, Yorkshire. Only times shown.

The Pekin has had a remarkable vogue among the duck-producers of America, no doubt owing to the fact that a propor-

PLATE NO. 30



Aylesbury Duck.

(*The property of Mr. J. Y. Wheatley, Appleton Roebuck, Bolton Percy.*)

Winner of 3rd Dairy 1907, 2nd Dairy 1908, 2nd Leeds 1907, 3rd Leeds 1908, 3rd York, 1908, 2nd Royal, 1908, 1st Chester, 1908, 1st Northallerton 1908, 1st Northallerton 1909, 1st Ripon 1908, 2nd Stokesley 1908, 2nd Manchester, 1908, Club Show etc.

tionately larger number of ducklings can be reared than from other stock; but beyond the possible benefits of crossing, it does not appear to offer any real advantages to producers in this country, who are already in possession of the Aylesbury and the Rouen. Upon these two breeds it would be difficult to greatly improve, for the early and late seasons production respectively. For table purposes the Pekin is rather deceptive in appearance, and may actually carry a larger frame than the Aylesbury, and yet weigh less; the frame being less abundantly covered with flesh, and the variety not lending itself to the fattening process. It is, however, very hardy, a good forager, and generally vigorous; and its peculiar appearance in comparison with other breeds, makes it attractive to some poultry-keepers.

There is only one variety, and the colour of its plumage is a uniform cream throughout, with bright orange bill, shanks, and feet. The head is large, broad, and high; the bill short, broad, and deep—and not such a straight continuation of the skull formation as in the case of the Aylesbury and Rouen. The cheeks are puffy, and the eyebrows heavy and overhanging, the general appearance being suggestive of a swollen head. The neck is thick and throaty; the body long and broad; and the breast wide and carried well forward without revealing the keel. The tail feathers incline well upwards, and are spreading in character. Short wings, close knit; stout legs and feet, well set back; and carriage peculiarly erect as described. Good weights would be nine pounds for a drake, and eight pounds for a duck. Considerations for exhibition are size, purity and uniformity of colour, symmetry and carriage,' and characteristic head.

—— **INDIAN RUNNER.** This beautiful and remarkable breed of ducks has come much to the front in recent years. One of the principal objects of the Indian Runner Duck Club is to preserve to the utmost the purity of the breed and to retain not only its unique type and characters, but also its wonderful utility qualities. An exhaustive descriptive standard has been published, and the club very properly insists upon a due recognition of the standard by judges.

In the past the progress of the genuine Indian Runner has been hindered by unscrupulous breeders and dealers sending out numbers of small mongrel ducks and Indian Runner crosses as pure bred. From these birds the general public and many fanciers formed a quite erroneous opinion of what an Indian Runner should be. Many of the popular poultry judges undoubtedly took their cue from these common-type ducks, which bore strong indications of a recent cross from the Wild Mallard, and were in point of beauty and utility qualities quite inferior to the true breed. Only the breeders who stood by the old breed have saved the true type and character of the variety. To Mr. J. Donald, Sr., of Wigton, Cumberland, more than to anyone else, the thanks of Indian Runner fanciers are due; but for his careful preservation of the breed the Indian Runner would have been extinct, so far as this country is concerned, and there is probably not a really typical specimen of the variety in the kingdom or the colonies which does not trace its descent, directly or indirectly, from the Wigton Yards. Of Indian origin, the breed was introduced into the county of Cumberland somewhere between sixty and seventy years ago, and although the variety attracted a good deal of attention locally, and early gained an excellent reputation as a prolific layer, it was kept in but few hands and practically confined to the county for many years later.

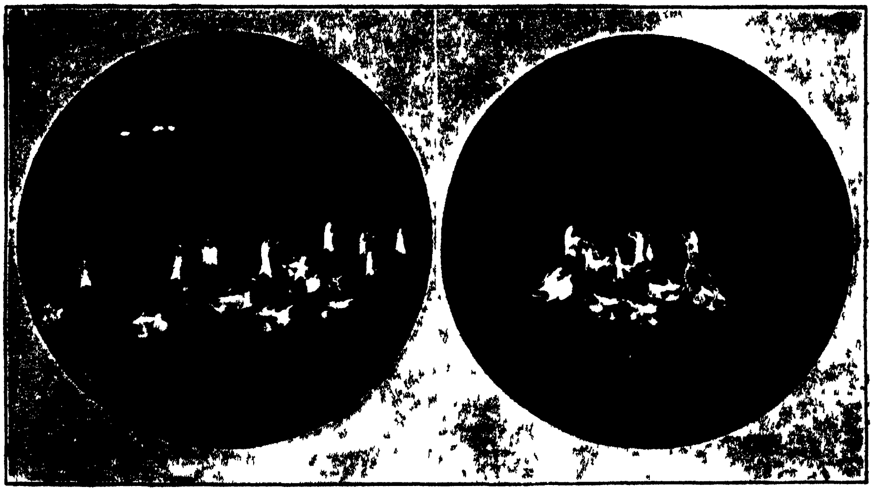
From accounts given by old people of the district it seems that the early birds were even more striking in appearance than their present-day descendants, and the writer believes that the originals were the *true* "*Penguin Duck*" (which now are extinct) and that our present Indian Runners are bred from progeny produced by crossing the Penguin duck with the common Cumberland breed.

Many of the best present-day birds throw striking Penguin qualities and the wedge head, fine neck and body, erect carriage and fawn colouring are all inherited from Penguin ancestors. It is generally agreed that all the domesticated varieties, with the exception of the Muscovy, are descended from the common wild duck or Mallard (Anas Boscas). The Indian Runner, although a comparatively small duck, differs greatly from any of our English breeds, and also from the Mallard in structure and carriage, and the distinctive outstanding features which it inherits are probably the result of a long period of domestication under unusual conditions and a peculiar climate. In the Mallard and common duck the skull is usually rather high, and the bill dished and flattened towards the tip, but the head of a good Runner is of quite different formation, the skull lower and flatter and the base of the bill strong and deep, fitting closely into the head, the bill being carried straight out its full length to the tip without any dish or flattening out. The eyes are placed high in the head and the neck must be very long and slender, gradually widening from the base and forming a funnel-shaped expansion towards the shoulders, which should be close and well knit, enabling the bird to carry the wings properly. The body must be of good length, tight, hard, closely feathered, well rounded and narrow. The thigh bones should be strong and of good length and the legs placed well back, so that the bird may have naturally erect carriage. The body and neck should be carried well in line, showing as little angle behind the neck as possible. From the legs the body tapers off backwards to the tail, which should be small and close. Often in verv heavy laying ducks the stern is full and somewhat rounded, but if the bird is good in other points a good deal of allowance may be made for a duck that shows rather heavy behind. The higher and more erect the carriage is the better—there is no danger of overdoing this point—an angle of 65 to 75 degrees is desirable, but very few birds come up to it now, and breeders should aim at an improvement in this respect.

The colour is very similar in both sexes with the exception of head markings which, in the drake, are darker and of a bronze colour with a faint greenish tinge.

The body colour should be a warm even fawn, not pale and washed-out looking on the one hand or dark greyish brown—like the Mallard—on the other. The colour fades quickly on exposure to the weather and allowance must be made for birds which have been in feather for a considerable time. When hatched, the ducklings have yellow bills, but as the birds mature the colour changes to a dull cucumber green in the duck and a more yellowish green in the drake. The legs are deep orange colour. The neck and throat are white and a cap and cheek markings adorn the head, a line of white encircles the base of the bill, separating it from the head markings, and another line divides the cap and cheek markings behind the eye. The fawn body colour commences at the base of the neck about where the funnel expansion begins and is carried down the front to about half-way between the point of the breast bone and the legs where it meets the white of the flanks and lower part of the body, the colour also extends down the back to the tail and forms a heart or V-shaped patch on the back. The wings being entirely white an indistinct line of colour runs backwards from behind the thighs to the tail. The division of the white and coloured portions should be as even and clearly defined as possible.

From an exhibition point of view the Indian Runner is one of the most interesting and attractive breeds that has ever come before the fancy. Its unique form and graceful style appeal to all lovers of the beautiful, whilst the clean-cut, magpie-like markings and the contrast of soft fawn and pure white give an added charm. As a utility breed it is in the front rank, being a capital forager and excelling all other varieties in the production of eggs. Although not a large bird it is plump and the flesh of fine quality. It is an ideal breed for the farmer or small holder, for it loves liberty and on a good range Indian Runners can find the greater part of their own living during open weather. The eggs are large and white-shelled. It is probable that the originals laid white eggs, and it is certain that their most direct descendants do so now, but a few years ago many of the leading winners laid green-shelled eggs. These birds had undoubtedly been crossed, for they lacked many important Indian Runner characters and, as a rule, had a distinctly common appearance.



Indian Runner Ducks.

Indian Runner ducklings are very pretty downy little things and the position of the markings can be seen when first hatched. The coloured portions of the plumage are generally of an indistinct brownish shade during the first feather—similar to the colour of adults in summer plumage. Type and carriage are essential in an Indian Runner. The clean-cut markings are a fine finish to a shapely bird, but the present markings are probably largely the result of careful selection by breeders since the variety was introduced into this country, and it seems quite possible that the originals may have been self-coloured or nearly so, and there is little doubt that they were of the light reddish-brown colour, commonly called fawn.

On no account should a really typical shaped bird be passed because it is rather heavy or uneven in markings.

The Club's standard allows 45 points for body shape and carriage, 30 for head and neck and 25 for colour markings and condition, so that perfect type is worth three times as much as perfection in colour markings and condition all combined. To go into all the defects of an Indian Runner would occupy too much space. Disqualifications are blue wing bars, claret breast, bright green heads—like Rouens or Mallards—inordinate trimming and wry tails in drakes. Fanciers should aim at producing birds of good average size, reachy and proportionate throughout. (*See Plates Nos.* 31 *and* 32).

—— **BUFF ORPINGTON.** The Buff

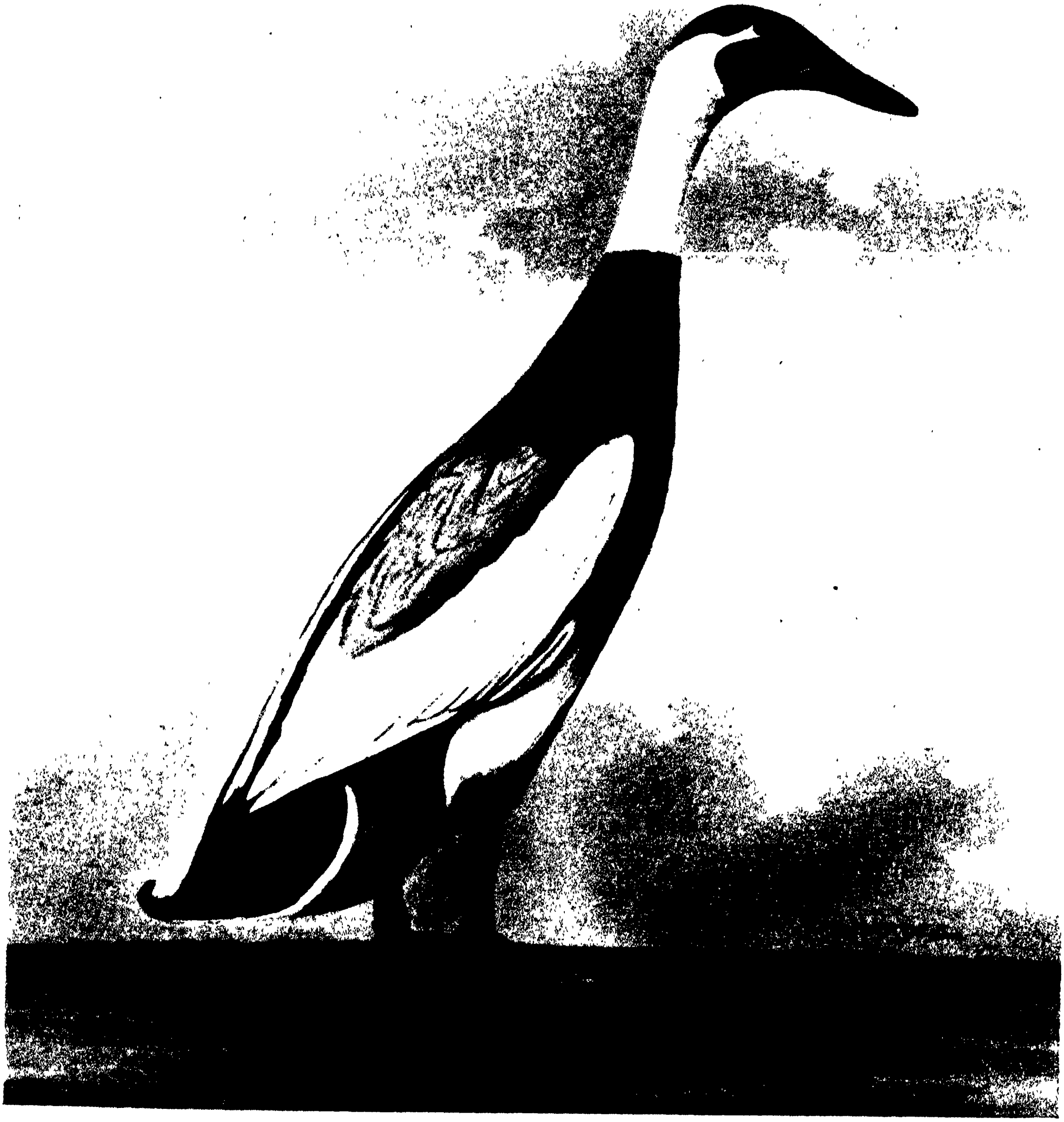
Orpington duck seems destined to attain the same measure of success that has fallen to the lot of the Orpington fowl. It may now be regarded as a permanent variety, and is the result of an elaborate series of crossings, chiefly between the Indian Runner duck and the Rouen drake. It is a utility bird, but highly ornamental, and with points that endear it to the fanciers. As a table bird it approaches perfection, for the rapidity of its growth is remarkable, the drakes attaining a weight of from 7 lbs. to 9 lbs., and the ducks from 6 lbs. to 8 lbs., attaining maturity at an early stage, the result being that the flesh is tender and most palatable. The build of the duck also specially fits it for the table. As a layer the duck is prolific, commencing to lay early and sometimes produce over 200 eggs in the year. It is also very fertile and easy to breed. Its general characteristics are a good carriage, and an aspect of alertness. It has a well-shaped head, the eye full and daring, with brown iris and blue pupil; bill of moderate length, straight from the skull, the colour yellow with a dark bean at the tip; neck fairly long and graceful; body long, broad, and deep, the back broad and long, the breast full and round; legs and feet of a bright orange yellow, strong in the bone, well set apart, toes straight and webbed. The tail is small, rising gently, with the usual curled feathers in the drake. The colour should be an even shade of rich fawn buff, which, in the drake, should be darker on the head and neck.

Blue Orpington Ducks.
The property of Mr. Art C. Gilbert, Swanley Poultry Farm, Wilmington, Kent.
Winner of two 1sts Eynesford, only time shown.

Although smaller than the Aylesbury and Rouen when full grown, the Buff Orpington duckling is increasing in favour on the market as a most serviceable bird; the quickness with which it reaches maturity, its freedom in laying, fertility, and handsome appearance all combine to make it exceedingly popular at home and abroad. There is a flourishing Buff Orpington Duck Club in England, and another in Australia. (*See Plate No.* 33).

—— **BLUE ORPINGTON.** The variety is an offshoot from the Buff Orpington duck. While the latter were in the making, in the early stages, it was found that from most of the matings many of the progeny

PLATE No. 31



Indian Runner Drake.

(*Bred and exhibited by Mr. Wm. G. Kingwell, Great Aish, South Brent, S. Devon.*)

Winner of 1st and Special for best Runner, Hayward's Heath; 2nd Dairy; 2nd Crystal Palace; 1st and Special for best Runner, Birmingham; 2nd Royal Dublin, etc.

were of a very dark shade, with blue showing distinctly on saddle, neck and thighs or fluff, and also in a lesser degree and lighter shade on, or rather among, the breast feathering. The birds showing the greater portion of this colour were then put on one side, and separate matings made with the object of breeding for a true blue. This was accomplished by using Cayuga, Pekin and Rouen drakes alternately on the ducks selected as stated above. Finally, the blue ducks were evolved, after many crossings back and forth. The traces of ancestry from the Pekin still show in the white neck and bib of many of them, while the Rouen occasionally crops out in the form of an apparently nearly perfect Rouen drake or two being bred from them. They are good layers of large eggs and nice table birds, active in habit and mate effectually without the aid of pond or river, thus being suitable for keeping with profitable results on any place where there is room. They were taken in hand by the Buff Orpington Duck Club at the Dairy Show Agricultural Hall, in 1908, the club issuing a standard and changing its title to the one now held, the Orpington Duck Club.

The general characteristics in both sexes as defined by the Club are as follows : The head should be fine, racy and oval in shape ; the neck fairly long and gracefully curved ; the bill, of a pea green hue, moderate in length, straight on to the skull ; the eye, with its brown iris and black pupil, bold and full ; the body long, broad and deep, the back broad and long, and the breast full and round. The tail should be small and rising gently, with the usual curled feathers in the drake ; the legs and feet orange and black in colour, should be strong in bone and well set apart, the toes straight and webbed. An even blue is desirable, but a white bib is allowed, the plumage being bright and glossy. In general appearance the carriage should be bold, the body long, broad and squarely built.

——CAMPBELL (ORIGINAL AND KHAKI). This breed was named after its originator, Mrs. Campbell. Hearing of an Indian Runner that had laid 182 eggs in 196 days, Mrs. Campbell became the possessor of this extraordinary layer, and mated it to a good Rouen. The result was a duck that could be relied upon to lay an average of 200 eggs in the year, and that would weigh about 5 lbs. at 12 weeks old. In order to improve the flavour and give hardiness and foraging qualities some Wild Duck blood was introduced, and a fixed type was established which was brought to the notice of the public in 1898. The characteristics of the Original Campbell are as follows :—The drakes have dark green heads and bills, grey backs, pale claret breasts, legs yellow, sterns black, slight ring round neck, weight about 5 lbs. The ducks, feathers are greyish-brown pencilled with dark brown, plain brown head, no streak from eye, and dark bill, yellow legs, no white on neck preferred, weight about 5 lbs.

The breed as established did not quite satisfy some of the critics, so efforts were made to obtain a duck that would be more sprightly and attractive in appearance. By careful crossings, a bird of a distinctly buff colour was obtained, the old blood of the original 182-egg duck was retained, and to distinguish it from its predecessor it was known as the "Khaki." This was introduced in 1901, and it is said to be second to none in laying properties. There is very little to choose between the two varieties. Some prefer the soft pencilling of the "Original," while others like the more distinct markings and colour of the "Khaki," of which the following is the standard :—The drakes are khaki-colour all over, except head and stern, which are bronze-green. The ducks are entirely khaki-colour, a delicate lacing of darker buff showing on each feather ; bills dark greenish-black in both sexes, and legs yellow. Both sexes should be free from white on neck. In order to ensure a daily supply of eggs throughout the year it is necessary to have a proper classification of ages. The birds are very hardy and prolific, and can be relied upon to come on to lay at from five to six months old.

—— **COALEY FAWN.** This is a new and very pretty variety originated by Miss Edwards of Coaley Poultry Farm, Glos. They have been bred for utility purposes, and have become very popular, as they lay all the year round, especially when duck eggs are in greatest demand and are not to be had from the larger varieties. They claim to rival Indian Runners in laying qualities, and to surpass them in size. As they are splendid foragers, they require very little food on free ranges. In colour they are an even shade of fawn, with chocolate-coloured heads in the drakes, orange bills and legs.

Coaley Fawn Ducks.
Bred by Miss Edwards, of Coaley, Gloucestershire

——**MUSCOVY.** Opinions are very divided regarding the origin and correct name of this variety, some connecting it with a duck at one time called the Turkish, and others affirming its identity with the so-called Peruvian and the Barbary. Perhaps the most commonly held theory is that the word Muscovy is a corruption of musk, an appropriate name on account of the characteristic odour of the skin. In any case, it is usually accepted as a fact that it is the domesticated Wild Musk duck, which is a native of the warm regions of South America. It is plentiful in Guiana, and its range extends south to Paraguay. It has been domesticated to a considerable extent within its native boundaries, and was probably introduced to the various European countries of its domestication some three or four centuries ago. It hybridises readily enough with the common duck, but the hybrid is sterile—according to available records. It is peculiarly active in its wild state, and is described as flying to the trees, in which it frequently perches, and sometimes even nests. It must not be confounded with the Musk duck of Australia, which is a different species. This variety is not only impatient of confinement, but will not thrive without freedom; and having liberty, the birds wander, and at times entirely disappear from the range for days together. In addition to this awkward trait, the disposition of the variety is evil to the point of savagery; and the conduct of a Muscovy drake, particularly in the breeding season, makes it impossible to keep any other description of fowl within his reach. On the other hand, the variety is capable of attaining considerable size, and a mature drake, weighing twelve pounds, is by no means uncommon, although the ducks are seldom more than half that weight. The ducks cannot be recommended as layers, being, as a rule, irregular and uncertain in production. For table purposes the flesh of the young birds is excellent, and despite the fact that the odour of the skin is suggestive of musk, the flesh is untainted.

The Muscovy is in particular characterised by a tubercle at the base of the bill, by curved edges to the mandibles, and by spurs at the bend of the wings. In its wild state almost black, the plumage is glossed with blue and green, and the wing coverts are white—the feathers giving an appearance of looseness. In domestication there are four recognised varieties, the most common being a pied black and white—in patches. The others are black, pure white, and blue-dun. The characteristics of the sexes are similar, the drake being without the usual curled tail feathers, although easily recognised by greater size. The head is large and crested; the neck, thick and short; the face, naked; the wings long; the legs and feet orange in colour; and the bill yellow. Fanciers judge it by size, colour, and characteristic head—in the order named.

Muscovy Ducks.

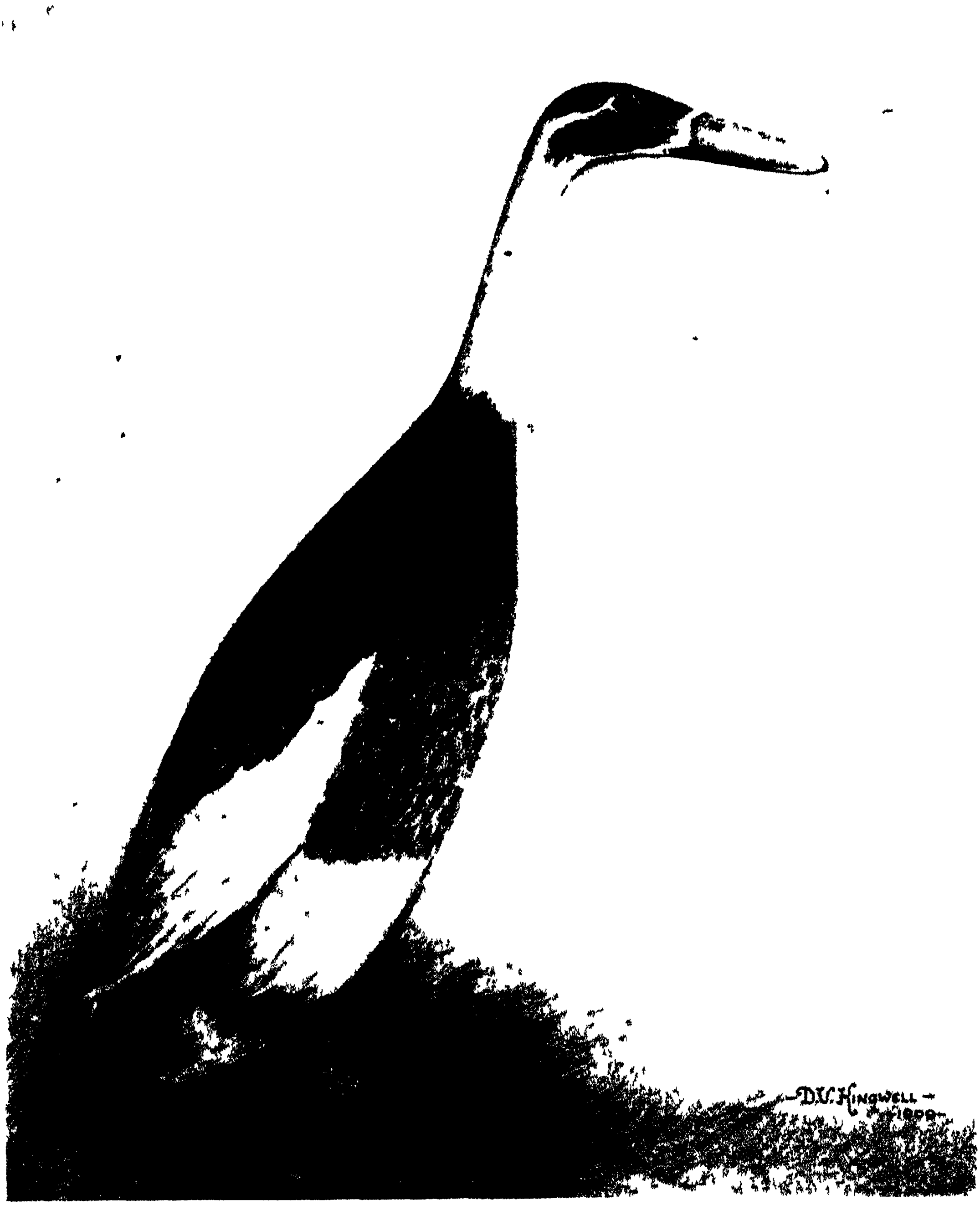
— —**CAYUGA.** The Cayuga has gained some amount of favour during recent years, but is still much less widely known in this country than it probably deserves to be; the chief hindrances to its greater popularity being its comparatively small size, as well as the dark colour of its flesh—both being disaddantages from the standpoint of the producer for market On the other hand, its flesh is excellent and full flavoured, despite its colour; the young birds grow quickly and attain a good size as ducklings The adults are hardy, good foragers, and fatten readily; they are also good layers, commencing early in the season, and their habits are quiet It is, therefore, a useful all-round variety for many whose chief object is not commercial, particularly in situations where a black plumage will retain its appearance better than a white

This breed has also been known as the Black duck of North America It is noteworthy that among the numerous lakes to be found there, one bears the name Cayuga; and as these or similar ducks (nearly allied to the common duck) are stated to abound there (although this has been contradicted), it has usually been mentioned as the habitat of the breed The Black duck is, however, very generally distributed from Labrador to Texas In shape and size it approximates to the Aylesbury more nearly than other varieties, and as birds possessing the same characteristics and colour are said to have been common in some parts of England—particularly Lancashire—before the introduction of the so-called Cayuga, the theory has been advanced that either or both originated from "sports" of the Mallard, or common domestic duck.

Mallard and Wild Duck.

As mentioned, its general shape is that of the Aylesbury type, with long, straight head and bill; long neck, long, broad body; flat back, and deep, full breast; and short, stout legs and thighs The colour is black and metallic in character, although sometimes brownish or purple, with a green sheen on head, neck, and wings; and some specimens moult a good many white feathers in their second year. The bill is slaty-black, with black bean and marking down its centre The eyes are black The legs and feet dull brown or black The characteristics are practically the same in both sexes, but

PLATE No. 32



Indian Runner Duck.

(*Bred and exhibited by Mr Wm G Kingwell Great Aish South Brent Devon*)

Winner of 1st and Gold Medal Crystal Palace 1st York 1st Leeds 1907 1st Birmingham 1st Dublin 1908, 1st and Special Plymouth 1909 the tail feathers of the drake are curled. Adult birds average from six to seven pounds. The most important fancy points are symmetry, colour, size, condition, and characteristic head. (*See Plates Nos.* 34 *and* 35).

—— **BLACK EAST INDIAN.** Although approaching the position of the Bantam in its relation to the larger breeds, the Black East Indian duck practically occupies an intermediate place between the entirely useful and the purely ornamental. Considering their rather diminutive size, they are possessed of sufficiently economic qualities to be classed as relatively useful, yet, on the other hand, one would have assigned them a place in the ornamental list, had not their apparent kinship to the Cayugas made it more appropriate and fitting to mention them in the same section.

This breed is referred to by Darwin by the name of Labrador, and he includes it as a subbreed under the head of "Breed I.—Common Domestic Duck"; adding, with regard to Black ducks, that they breed true, and may perhaps be classed as a breed. It has also been variously described as Buenos Ayrean, and Brazilian.

Irrespective of size, the similarity which exists between the Black East Indian and the Black North American is so striking as to suggest their origin in a "sport" from the Mallard, as is the theory regarding the larger variety; or as has also been suggested, that one variety sprang from the other—the large from the small, or the small from the large, as the case may be. In any event, many breeders and authorities have shown that not only are they alike in colour, and subject to similar defects in breeding, but that their economic qualities are similar, making due allowance for the difference in size.

—— **BLUE SWEDISH.** Blue, or slate-coloured, ducks have been common enough in different localities in this and other countries, and in each district they have acquired a local name. At least one strain of so-called Blue ducks has achieved a wider reputation in consequence of its support by a specialist club in the United States of America, which has officially described the bird of its fancy as the Blue Swedish duck. The Blue Swedish resembles the Rouen in size and shape, but differs in colour. Its plumage is of a slaty blue colour, relieved by a white spot or "bib" upon its throat. It is said to have originated in Sweden, and perhaps was imported from that country, but it would seem to be not a very difficult variety to manufacture from a cross of

Huttegem Ducks.

the Rouen with either the Pekin or Aylesbury duck. It was probably so produced, but it is said to breed with as much fidelity as can be expected from any variety of poultry with this colouration. Blue is the most evanescent of colours among fowls, and in the longest established varieties there are frequent reversions to the black and white elements of which this colour is composed.

—— **HUTTEGEM.** The Huttegem is a Belgian variety, of which a few specimens are to be seen in this country. They take their name from the village of Huttegem, in East Flanders, the centre of the Belgian duck industry. There are two varieties, the Blue and the Dark Fawn, which differ but very slightly from one another. The Huttegem is a bird of medium size, not unlike a Cayuga in shape, but somewhat larger. The back of the head, neck, breast, and underparts of the body are white, the rest of the head and body are slate-blue in the Blue variety, and dark fawn in the Fawn. The Huttegem is a very rapid grower, the ducks commencing to lay when about five months old, and the ducklings are ready for killing at about the age of eight weeks. The latter are exceptionally hardy, and require practically no brooding. The ducks are good layers and excellent foragers, and are non-sitters.

—— **JAPANESE.** Ducks which are apparently characteristically the same as the Pekin are bred for utility purposes in Japan, and as they are in any case of Eastern origin, it is a question as to which country is entitled to the primary claim as regards their evolution. It is, however, probable that the name Pekin has been applied to them on account of the fact that they were first known to Western breeders through the agency of Chinese exporters. Anyway, there undoubtedly exists a variety that, for want of a general comprehensive name, may, in the meantime, be referred to as a Japanese "Pekin"—because it appears to be essentially the same. The Japanese birds have been imported into the United States of America for the purpose of infusing unrelated blood into some of the flocks of Pekin ducks already established there, and with excellent results. One breeder in Illinois reports that the pure Japanese eggs have tested an average of 95 per cent. fertile, and hatched 90 per cent. of all eggs set, other reports state that they have tested 100 per cent. fertile. According to an American journal, "Poultry Husbandry," a pen of Japanese ducks was first shown at Madison Square in 1906. They were then seven months old, and averaged eight and a half pounds in weight; and the same Illinois breeder states that at eight weeks old the ducklings weigh the same as the best American strains of Pekin. In some cases the ducks of Japanese strains produce an average of 155 eggs each annually. (*See* "Mallard"; also "Waterfowl, ornamental.")

DUMPIE. Generally known as Scotch Dumpies or Gae Laighs, but sometimes called Bakies. They are not a very popular variety, but those few breeders who keep them are very true to the variety and have bred them for a number of years. They are bred mostly in the south west of Scotland and on the Isle of Arran. At the latter place it is quite the usual thing to see classes for this breed at their shows, which are generally well supported. No doubt if they were better known there would be a considerable number of breeders who would take up the Dumpies, for as an all-round utility breed it will compare very favourably with most varieties of fancy poultry. They make good table birds, are very fine layers of good sized eggs and excellent "sitters," and brood their chickens well. Being short on the leg, they keep the little chicks warm and do not walk them far. For pheasant rearing they are quite the ideal breed, and hens of a cross between Dumpies and Silkies are much sought after for this purpose. Their mode of walking is very peculiar, something between a waddle and the action of a duck. The principal and most important characteristics of the Scotch Dumpie is to have a long square body with short legs; the body should be of a similar shape to a Dorking, but a good deal longer and the breast should be well filled out, long and deep; head and neck medium size; comb either single, evenly serrated and medium sized, or a neat rose comb (the single comb birds are the most popular); ear lobes and wattles rather small and neat; tail fairly full, with good flowing sickles on the male birds; legs very short, not more than two inches long in shank and quite clean from any feathering; toes medium length, well spread. The colour of the comb, face, ear lobes and wattles in both sexes, and all varieties, should be a bright, healthy red; beaks white or white and horn colour; legs and feet white. The favourite colour for Scotch Dumpies is Cuckoo or Barred, similar to a Scotch Grey. The light and dark bars should be of the same width and very distinct and sharp at the edges of the bars, and of an even colour throughout. There are also some good blacks and some marked somewhat similar to the Dorkings.

DUST BATH (*see* " Houses.")

DYSENTERY. Dysentery is really aggravated diarrhœa, and is recognisable by the excreta being jelly-like and tinged with blood. It is very dangerous, especially to chickens. It is closely allied to cholera and enteritis (which see). The best treatment for it (and indeed for the allied diseases) consists in giving emollients like barley water—a simple remedy, and one easy to prepare. Let the fowls drink as much of this as they like. It has an excellent effect upon the irritated membranes of the intestines, which set up a catarrhal condition. Fowls with dysentery must not have any solid food for a day or two; therefore, reliance must be placed to a considerable extent upon barley water, which accordingly should be made thick—almost gelatinous. Birds suffering from these complaints are generally very thirsty—a sign of feverishness—and they will quite readily take barley water. One or two drops of the homœopathic tincture of aconite will be beneficial in bad cases, as it tends to reduce the fever (which is due to slight blood poisoning)—the reason why fever is always dangerous. Occasional doses of olive oil or almond oil, or linseed oil, will also be beneficial. Castor oil, recommended for simple diarrhœa, should not be given for dysentery, as its effects are too drastic, and there is danger of perforation of the intestines which would cause immediate peritonitis and death. In some cases, when there is acute diarrhœa, but not definite dysentery, a dose of castor oil at first may do a great deal of good by clearing the intestines of the foetid matter which is causing the trouble; and from one to three drops of laudanum may be added to the castor oil often with great advantage. On recovery a few tonic pills or something in the nature of a stimulant, like Parish's food, may be advantageously given to a bird in order to assist in bringing it back to condition.

EARLY CHICKENS (*see* " Rearing.")

EAST INDIAN DUCKS (*see* " Ducks.")

EARTH RUNS, TREATMENT OF (*see* " Accommodation.")

ECONOMIC PRODUCTION (*see* " Farming.")

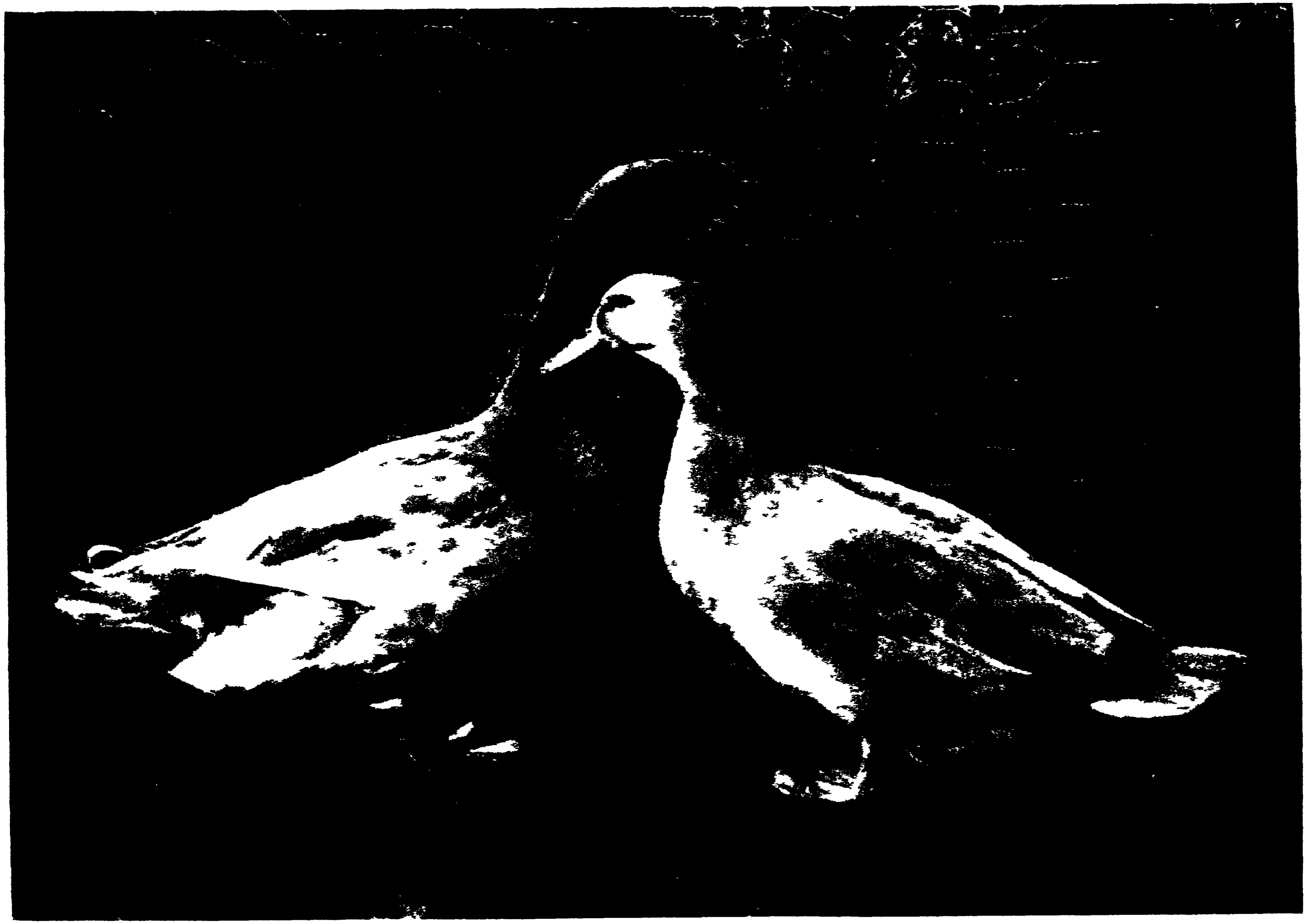
EGG-EATING. Egg-eating is a vicious habit, and once it is acquired by a hen it is no easy matter to cure her; and unless the culprit is early discovered and removed from the company of others, there is considerable danger of the habit becoming general. It is probable that the habit is frequently acquired in the first instance in consequence of a bird producing shell-less eggs, or dropping an egg from the perch when roosting; in either case, the hen or hens will naturally investigate as regards the character of the contents, and having once tasted an egg they want more—with disastrous results as regards the profitable aspect of egg production. Many poultry-keepers encourage this practice, by giving their fowls broken egg-shells, and having eaten primarily for the lime the birds experiment with whole eggs, and discover a pleasant food in addition to what they originally sought. If the poultryman always allows his fowls free access to a good supply of broken oyster-shell and fresh green food, although it will not of course prevent accidents, such as have been referred to, the free use of such food and material will largely prevent the predisposition of the birds to this or other vicious habits; and an additional precaution consists in the provision of a good range and some incentive to constant activity. A busy hen is seldom vicious.

An old-fashioned method of prevention was the use of a kind of trap-nest with a false bottom, through which the egg rolled on to a bed of hay, out of sight and reach of the hen; but such contrivances are seldom used now-a-days, and if hens are healthily kept and their egg organs are in normal working condition there is seldom much trouble with egg-eating. It should, however, be known that the cock bird is often a worse offender than the hen, although, where recording nests are in use or the eggs are frequently collected, such a bird does not get much chance to steal. As to the actual curing of a fowl that has contracted the habit, some practical men recommend the cutting of a small piece off the point of the bill—using a sharp penknife, but being careful not to cut too far down—but such a course should only be resorted to when other attempts fail; and it is probably better to kill a fowl than to interfere with the bill. A plentiful supply of china eggs in the nest boxes will often tire a hen, and cause her to give up the attempt entirely; but a more satisfactory plan is to fill a shell with some such mixture as mustard and cayenne, and put it in the way of the egg-eater. A second dose is seldom necessary, and certainly not a third.

EGG. STRUCTURE AND COMPOSITION. It is commonly, although perhaps vaguely, understood that an egg contains all the elements of a well-balanced food, in the proportions most suitable for the development, growth, nourishment, and heating of the human body; and it is a commonplace that the dietetic value of a pound of eggs is equal to that of the same weight of best beef, in which case it is probable that in ordinary circumstances of production the average cost to the egg producer is about one-third of the price he pays for butcher's meat. The question of the composition of this universal article of food being of some importance, it may be briefly referred to before the structural details are considered. The standard weight aimed at in egg production for commercial purposes, is that generally preferred by caterers for the restaurant and tea-shop trade, *viz.*:—two ounces, or 875 grains. It will, however, simplify matters if we suppose an egg of 1,000 grains weight, and the average proportions of such an egg would be—600 grains white, 300 grains yolk, and 100 grains shell. Taking these several parts separately, we find that the average composition of the white is—dry albumen, 15½ per cent; salts, etc., 4½ per cent; and water, 80 per cent. In the yolk, which is an emulsion of a strong albumen solution with oil in suspension, the average proportions are—dry albumen, 17½ per cent; oil and salts, 28¾ per cent; and water, 53¾ per cent. And finally the

(*The Encyclopædia of Poultry.*)

PLATE No. 33



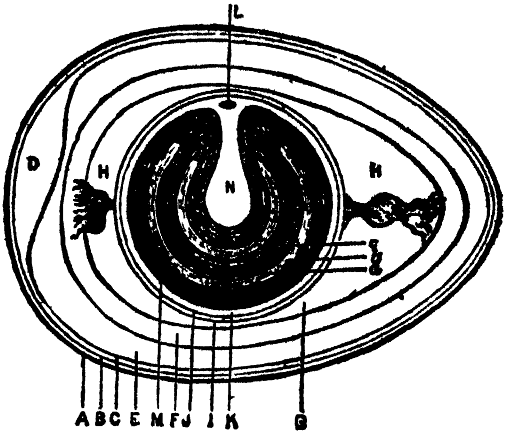
Buff Orpington Ducks.

(*The property of Mr Art C Gilbert Swanley Poultry Farm Wilmington Kent England*)

Sires of all the 1st prize winners in 1908 at Hayward's Heath the Dairy Show the Palace Manchester Paris International Brussels etc

shell is, as is well-known, composed of calcareous matter.

Relative to the structure of the egg, and commencing with the external covering, the calcareous shell is composed of particles of matter regularly deposited with the general object of combining strength with porosity. Actually this shell consists of a thin outer and a thicker inner layer or deposit, and both are vertically pierced with free openings on the inner and outer surfaces, through the medium of which the interchange of gases continues without interruption, and respiration is rendered possible to the developing embryo. The pitted or pore-like appearance of the exterior surface of the shell is merely the result of impressions made by the formative membrane of the egg organs, the interchange of gases and the atmospheric penetration of the shell depending upon minute pores of microscopic dimensions. In connection with this porous character of the shell its first effect is observable in the accummulation of air, between the lining membranes, following condensation and evaporation subsequent to the laying of the egg. This accumulation occurs at the larger end of the egg, and is relatively small in a newly-laid egg, but increases with the age of the unincubated egg; or, as in the incubating egg, as the contents condense. It should be noted as a peculiarity that the air within this space is more highly oxygenized than the ordinary atmospheric air. The lining or shell membrane is double, as indicated above, and the outer section is thicker than the inner; the membranes only separating to the extent of the space required for the accommodation of the accumulation of air. Immediately beneath this shell membrane is what is commonly known as the white of the egg, consisting of alternate layers of albumen, some denser and some more fluid; and a peculiarity of this portion of the contents is a spiral arrangement of the white at either end of the egg. These coils of albumen are technically known as the chalazæ, and are really denser twisted layers of albumen extending from the two ends of the egg to the nearest opposite portions of the yolk. The outer ends of these coils are not attached to the shell membrane, and as it were, float free in the more fluid albumen; but the inner extremities expand and connect with a dense layer of albumen which surrounds a more fluid layer coming next to the yolk. The obvious purpose of these coil-like arrangements is to steady the yolk in order that it may retain a safe position in the midst of the albumen, practically unaffected by any but violent movements of the egg.



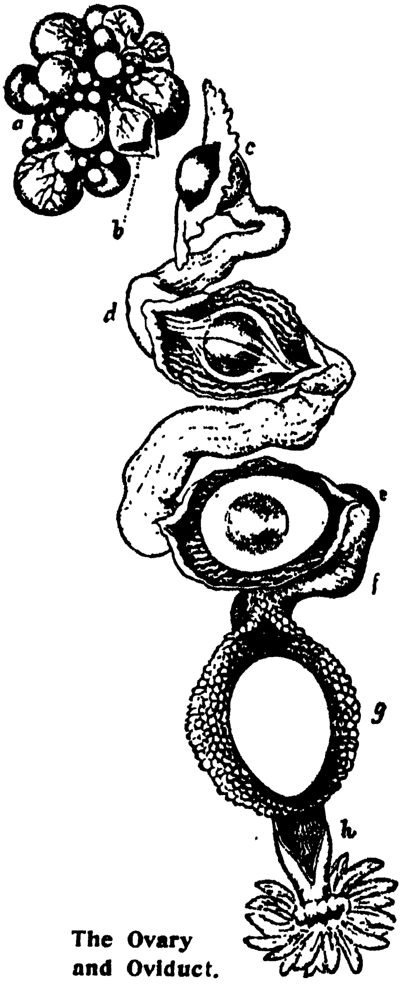
The Formation of an Egg.

The section of an egg, which we illustrate, will enable the reader to form some idea of its constituent parts A represents the shell, B, membrane adhering to the shell, C second membrane slightly attached to B, except at large end of egg, where they separate to form D, the air space, E, the white or albuminous part of the egg (first layer liquid) F, the white of the egg (the second layer semi-liquid), G, the inner white H H, chalazæ The chalazæ are two twisted cords They are well-known to all eaters of eggs, and are the portions which cooks take out when beating an egg I, is the outer membrane J, very fine vitelline membrane, separating the yolk of the egg from the white, K, the outer part of the yolk L, the germ, M, the yolk N, the utille, the interior part of which contains the germinative vesicle and *a b c*, separate layers comprising the yolk For these details, and for the illustration, we are indebted to Mr E Brown's "Poultry-Keeping, as an Industry for Farmers and Cottagers"

The substance of the yolk is contained within a very transparent membrane, devoid of pores; this membrane is elastic and its surface responds quickly to any motion, being thrown into wrinkles. Immediately below this membrane and upon what may be termed the upper surface of the yolk (on account of its capacity to retain its position), is a very small almost opaque spot, called the germ-spot or blastoderm. Certain microscopic differences are observable in the appearance of this spot, according as the egg has been fertilized or not, and in the event of fertility the blastoderm undergoes changes during the passage of the egg along the oviduct (consequent upon the temperature to which it is then exposed), but these changes practically cease and the germ remains dormant from the time of laying until again subjected to the direct influence of the incubating heat. Relative to the constitution of the yolk substance, although this appears to be of a uniform consistency and structure throughout, there is a flask-shaped portion which does not become so solid as the rest when an egg is boiled hard. What may be termed the mouth of this portion is expanded and situated beneath the blastoderm, forming a kind of support with its base in the bulb-like portion situated in the centre of the yolk. As the specific gravity of the yolk is less than that of the albumen with which it is surrounded, the germ or blastoderm is pressed upwards; this upward tendency being limited and regulated by the weight of the dense coils of albumen (or chalazæ). These chalazæ are attached just below the axis of the yolk, and by the addition of this weight to the lower half, the half supporting the germ remains the lighter, and, therefore, the uppermost—the rotation of an egg being in natural circumstances on its long axis.

——**PROCESS OF PRODUCTION.** The egg originates within organs termed ovaries, which are glandular bodies situate in the abdominal cavity of the hen—for a more detailed description of which the reader is referred to the article "Anatomy"—and it may be noted that in the case of the fowl there is a violation of natural symmetry, in that the left ovary alone has that racemus appearance usually likened to a bunch of grapes, the right ovary and oviduct being atrophied. The grape-like bunch consists of primitive eggs in their rudimentary stage of development, varying in size according to their several degrees of progress towards the maturity we know so well. At that period the primitive egg is practically similar to that found in all animals, the differences consequent upon the variations of species appearing at a subsequent period; and the primitive egg merely consists of the yolk substance, which with the germinative dot is enclosed within the thin membrane, called the ovisac. Ovulation occurs when the primitive egg arrives at its initial maturity, in other words, it ripens and becoming detached from the ovary with which a thin stem has connected it, it drops into the mouth or funnel-like opening at the interior extremity of the oviduct. This egg passage or canal is nearly two feet in length, and after the manner of the rolling snowball, the egg gains in bulk as it progresses, the various layers of albumen being added to the original primitive egg (consisting of yolk and germ). When the albumen has become completely attached, the whole is enveloped in a double casing of membraneous substance; and finally the shell is formed immediately before the complete complexity is expelled from the exterior opening of the oviduct. Relative to the reproductive property, it may be briefly explained that, as has been mentioned, the germ cell is a product of the ovary, but that for the formation of an embryo from which an organized body may be developed, it is necessary for the sperm-cell to be also present. The embryo cannot be satisfactorily explained, but it is that which exists from the moment of impregnation until the incubation of the egg is completed, and it has become developed into a living chicken. It is usual among poultry-men to refer to such impregnated eggs as being fertile (*see* article " Fertility "), and it will be obvious that eggs produced without a bisexual condition contain the germ-cell only, and are consequently infertile; the reproductive cells or sperm-cells, are produced by the male, so that fertility and reproduction are impossible without a co-operation of the sexes.

It is really much more essential than is generally recognised, that the producer of eggs should have some knowledge of the first principles of egg production, in order to avoid such a common mistake as to assume that the output of eggs may be forced into a kind of perpetual motion dominated by condiments. Novices, too, commonly suppose that production depends upon the quantity rather than the quality of the food, and consequently over-feed their fowls in such a way as to absolutely stop that which they wish to promote; just as others buy fowls and expect production as a matter of course, without realizing that their own treatment of the birds is an all-important factor. Apart from such questions of management, which are fully discussed in other sections, it will be advantageous to impress as a first principle the fact, that a hen's possible egg production is subject to natural limitations, which no system of management can hope to extend or widen indefinitely. A certain production is possible, but under no circumstances can it be exceeded; and the possibility appears to be an individual matter, influenced by heredity and strain. Whilst it may be admitted, and it is easy of proof, that one hen is able to produce more eggs than another, it may be asked what is the approximate average? The answer to this question may very well be found in the written opinion of Mr. W. B.



The Ovary and Oviduct.

This plate shows the different stages in the development of an egg (*a*) is the ovary, showing yolks or ' ova ' in different stages of development, held together like a cluster of grapes As each yolk or ovum grows to its full size it drops off and passes through (*b*) the mouth of the oviduct; (*c*) is the open mouth receiving it Immediately upon entering the oviduct it meets the spermatozoa and becomes fertilized (*d*) (*c*) and (*g*) show the egg in different stages during its passage to the outer world. It passes with a rotatory motion, layers of albumen being twisted around it, and then first the shell-membrane is formed and afterwards the shell itself. It takes from 3 to 4 hours for the egg to pass down to the point (*d*), then 16 or 18 hours for the rest of the journey—so that often there are two or three eggs together in the oviduct The point (*f*) indicates the last convolution of the passage, and there the wall of the oviduct is thickest and strongest—the shell having practically become hard; (*g*) shows it about to pass into the cloaca, and (*h*) is the cloaca communicating with the outer world through the vent.

Tegetmeier (whose claim to write with authority upon such matters needs no insistence) — this gentleman, in 1905, stated in the "Field," that :—"The number of germs contained in the ovary of a hen cannot be determined by the most careful microscopic examination, but that they exceed 500 or 600, is exceedingly incredible." Such a statement from a naturalist of such established standing is significant, and should be sufficient to give pause to those who put forward extravagant claims regarding egg laying records, which are "exceedingly incredible." As to the periods of production it may be accepted as a further fundamental principle, that the greater proportion of a hen's production will take place during the first two full laying seasons, and that the natural sequence is for production to become less with each succeeding year. A further important fundamental truth concerning production is that, although the ovary of a hen may contain a full complement of primitive germs, these cannot develop into finished eggs if the feeding is insufficient or wrong in character. The various processes which claim their requirements from the food consumed must first be satisfied. The wasting and decaying tissues of the body (and the process is continuous) must be renewed from the nutritive substances of the food; and in the case of a pullet, there are considerations of incomplete growth and development; whilst in both there are periods of unusual demand when the renewal of the plumage causes an excessive draft upon the nutriment supplied; and when nature has satisfied all these primary requirements—and not till then—she applies any surplus to such other purposes as egg-development and production, if the surplus is suitable. Otherwise it probably goes to the formation of unnecessary and, in the circumstances, undesirable fat.

Copyright, "The Molassine World"

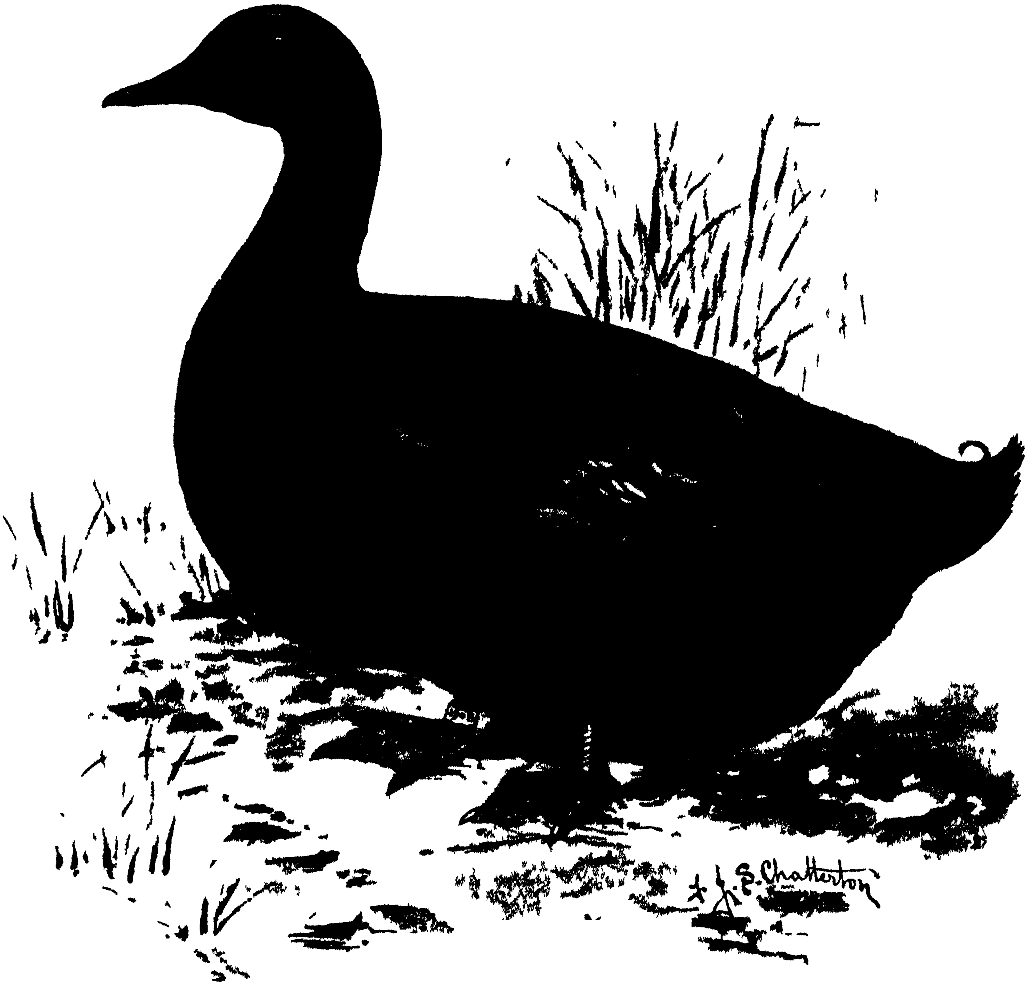
Egg of Domestic Fowl, Abnormal Shape.

Weston Park Museum, Sheffield

——**ABNORMAL.** Under this heading may be included such productions as soft or shell-less eggs, such as are unusually large or small, double-yolked, yolkless, or mis-shapen; any or all of which departures from the normal are not only unprofitable, but must be regarded as symptomatic of some derangement of the egg organs, defective feeding, or pure accident. It is, therefore, essential to the well-being of both the poultry-keeper and his fowls to investigate the causes directly the results appear. The majority of such difficulties may be overcome very easily, if steps are taken at once to trace matters to their source, and to alter the conditions accordingly; and it is usually the case that such eccentric eggs are produced by excessive feeding, or the too free-feeding of highly stimulative feeding stuffs.

Anything in the character of the food that tends to unduly hasten production, may very easily be responsible for the almost simultaneous freeing of two ova and their inclusion within one shell, or

PLATE NO. 34

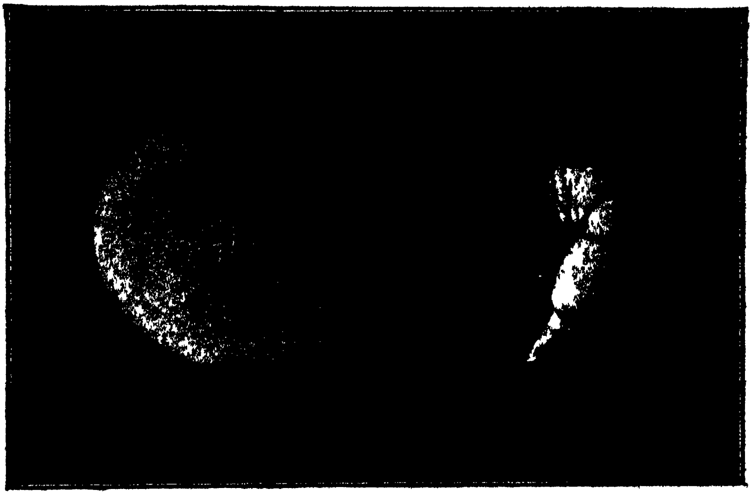


Cayuga Drake.

(*Bred and exhibited by Dr. J. Barry Sykes, Manor House, Formby, Lancashire.*)

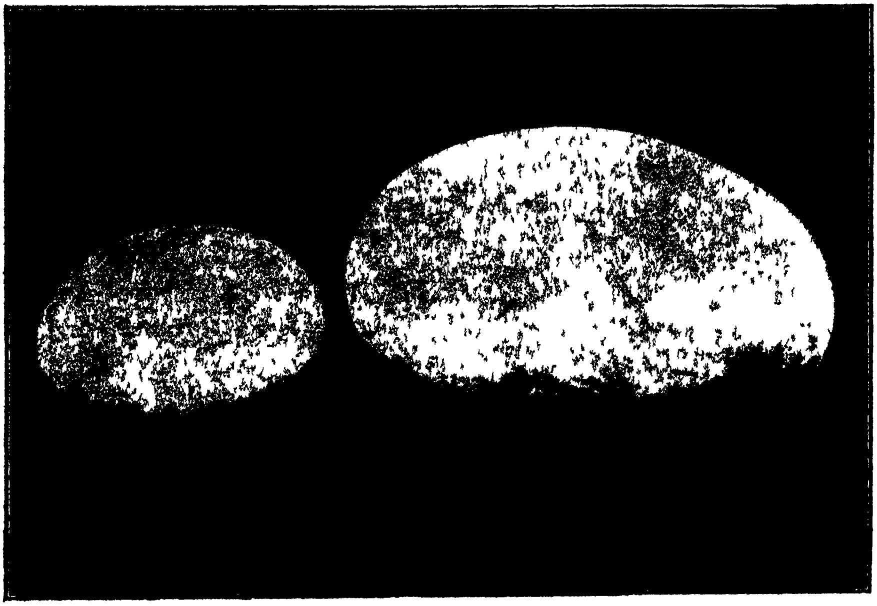
Winner of 1st Waterfowl Club Shows, Manchester and Crystal Palace, only times shown. (The above bird is the nearest specimen to the Ideal we have yet seen, and shows the great improvement obtained in this breed in recent years both as to size, shape and lustre, the latter now being equal to the wonderful little East Indian duck.)

in the result one may receive a shell and the other appear without that covering. Overfeeding is a frequent cause of very small eggs, one perfect egg included in a second shell, or the production of the albumen and shell without the inclusion of a yolk. In the double-yolked egg it commonly happens that the white is also duplicated, and when such are fertilized and incubated, the result is generally an abnormal chicken, possessed of more than the usual number of legs, or otherwise deformed; it sometimes happens, however, that the two embryos will develop independently, and there are instances in which one has hatched and lived and the other has died in the shell—apparently sacrificed to the more fit of the two. A result of over-stimulation may be seen in mis-shapen or crooked eggs, generally resulting from the forced juxtaposition of the eggs in the oviduct, and the formation of the shell of the second egg when it is in contiguity to its predecessor, which is already covered with a hard shell. Eggs no larger than marbles are sometimes a cause of wonderment, and are explained as being the production of birds whose ova are practically exhausted by continuous laying, but whose secreting organs remain active, the tiny eggs produced in consequence of this condition being in reality nothing more than small quantities of albumen enclosed in shell. They are not, in fact, eggs at all in the proper sense of the word, but merely products of the oviduct that have had no connection with the ovary—and as such are of some interest to the curious. Another peculiarity is the occasional production of an addled or putrid egg, on account of which the salesman may perhaps be unjustly blamed. If an undoubtedly 'new-laid' egg is found to be rotten, it may be assumed that the hen that produced it is over fat internally. The explanation is that the egg is unable to progress in a regular manner owing to the fatness of the oviduct, and if it is fertilized this undue retention and lengthened exposure to a high temperature within the body of the hen results in the commencement of the process of putrefaction. Variations in colour are generally the result of diseased organs, and sometimes the layer of a white or tinted-shelled egg will produce one that is dark green or black, such shells being generally abnormal as regards roughness or corrugation of the surface. Eggs with unusually pale yolks are often the result of an anæmic condition, brought about by under-feeding, conditions of too close confinement, or an insufficient supply of green food and grain of a suitable character. Some of the above-mentioned happenings are, as indicated, not always indicative of disease or derangement of the productive organs, but may be very exceptional—in which case it is probable that the cause may be merely accidental,



A Malformed Egg.

and consequently not likely to occur again if proper precautions are taken. For example, the sudden dropping of a hard or soft-shelled egg, together with the moping behaviour of the hen, may indicate that the available herbage is affected with ergot; in which case the fowls should be removed to another run until the cause of the abnormal production has been thoroughly removed by the close cutting of the grass and careful removal of the cuttings. Shell-less or otherwise abnormal eggs, are in some instances the result of fright, such as the driving of the hens by a dog, or the presence of a persistent bully in the flock; if such a cause is discovered, the necessary precautions are obvious.



Remarkable Twin Egg.

The large egg portrayed above was laid by a cross bred Buff Orpington Leghorn hen It weighed 7 ounces, and measured round its length 10 inches, and round its girth 8 inches When broken open the small egg was found inside

In general, however, such productions are referable in some measure to mismanagement, and the poultry-keeper who is so troubled should in the first place carefully consider and revise his dietary as regards his whole flock, at the same time endeavouring to discover the particular bird affected, and isolating her under a special treatment—including confinement in a darkish shed, and feeding sparingly with dari and peas with a little water, until Nature has restored the normal working of her egg organs. All fowls require a constant supply of calcareous matter—pounded oyster-shell, old mortar, etc.—the former is preferable, and may be prepared by baking in an oven until brittle, or by immersion for a few days in a bucket with a little freshly-slaked lime and a subsequent exposure to the air. In addition, the supply of suitable vegetable food—fresh daily—is essential to the due maintenance of a healthy productive condition; together with a well-ventilated and clean roosting place, and, as far as possible, the freedom of a good grass range. Fowls so kept seldom trouble their owners with abnormal productions. It should, however, be remembered that in some cases the eggs abnormally produced are the direct result of deep-seated disease, in which case, the affected birds should be killed at once.

EGG-ORGANS, DISEASES OF. In dealing with this subject reference should be made to the description of the egg-organs of a hen given under the heading of "Anatomy." As the ovary begins to be active, each "ovum" or immature egg ripens in turn, and starts on its passage through the oviduct. At that time, *i.e.*, when it becomes detached from the placenta or wall of the ovary, it consists practically of what we term the yolk. The white is deposited around it as it makes its way through the oviduct, fertilization has necessarily taken place, if not actually within the ovary, at least just at the commencement of the oviduct passage. From the point at which the egg becomes detached and starts on its journey, the danger of accident, of course, steadily increases. Most egg troubles arise from accident, though the general health has a great deal to do with the matter also. Young hens suffer from egg-cramp (which see), but egg-binding generally affects the older hens which lay the largest eggs. (The older a hen is the larger and fewer her eggs become, as a rule).

The reasons why old hens lay large eggs are, firstly, that they get fat and lazy; and, secondly, that their oviducts have become widely distended, and there is consequently a greater tendency for two yolks to become combined to form a single egg. Then again, there is, of course, more likelihood of a diseased condition, and inflammation is likely to occur more frequently with them than with healthy younger hens. So the middle-aged hen suffers less from egg-binding than either her mother or her daughter. On the one hand, she has not become worn out, and on the other hand, her oviduct has reached its normal size.

It will be important first of all for the poultry-keeper to know how to deliver or assist in delivering an abnormal egg. Here mechanical means will have to be employed. The hen's vent should be exposed to fairly hot steam as a preliminary. Next let a soft feather well saturated with oil be introduced into the passage to act as a lubricant, and then for a time the hen may be left to herself. Should the egg not appear in the course of a few hours or so, a further steaming and oiling may be tried; but great care should be taken to guard against any fracture of the egg. In the vast majority of cases the hen will deliver herself. Those cases where the bird has died from egg-binding have generally been cases in which there has been too much interference, or, at least, it has been too premature. Some people are very fond of interfering in matters of this kind, usually in the most clumsy and ignorant manner possible; whereas, if left alone, Nature would herself effect all that is needed.

Copyright, "The Molassine World."

An Egg with a Small One Inside It.

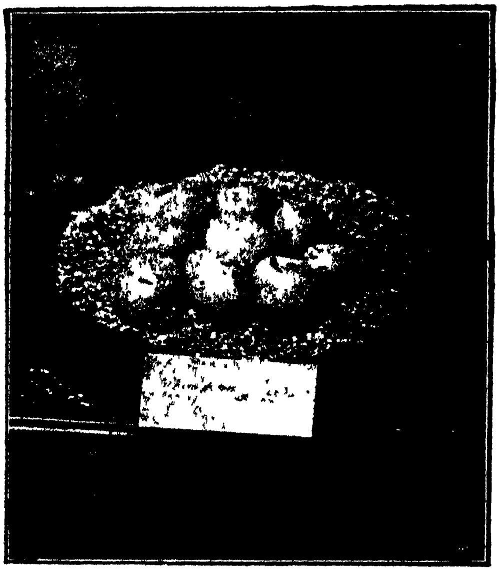
Weston Park Museum, Sheffield

——**SOFT-SHELLED EGGS.** These may be due mainly to any of three causes:—

Want of Shell Material. If a hen produces eggs in such a rapid succession that they cannot get their shells properly formed before they are pushed on by others following behind, the result is easy to understand. This, however, comes under the same general principle, *i.e.*, that a hen, if she is to "shell" her eggs properly, must have in her system an ample supply of lime salts for the purpose. These lime salts are present in the blood.

They come originally from the food, and when they get into the blood they are carried along until they find a resting-place in the walls of the oviduct, where they remain until they are wanted for the eggs. Therefore, care should be taken that all the hens have a suitable supply of lime, preferably that they get plenty of oats (which contain,. as does wheat, lime in good percentage).

Sudden Fright. Hens suddenly frightened or hens which meet with accidents, such as falling from a perch, will often abort, *i.e.*, discharge the partly-formed egg before it is properly ready. Above all things, laying hens should be kept as quiet as possible. Even much interference from cocks — especially active young cockerels — is undesirable, and many poultry-keepers have testified to the fact that hens will often lay better when they are entirely freed from the attentions of male birds.



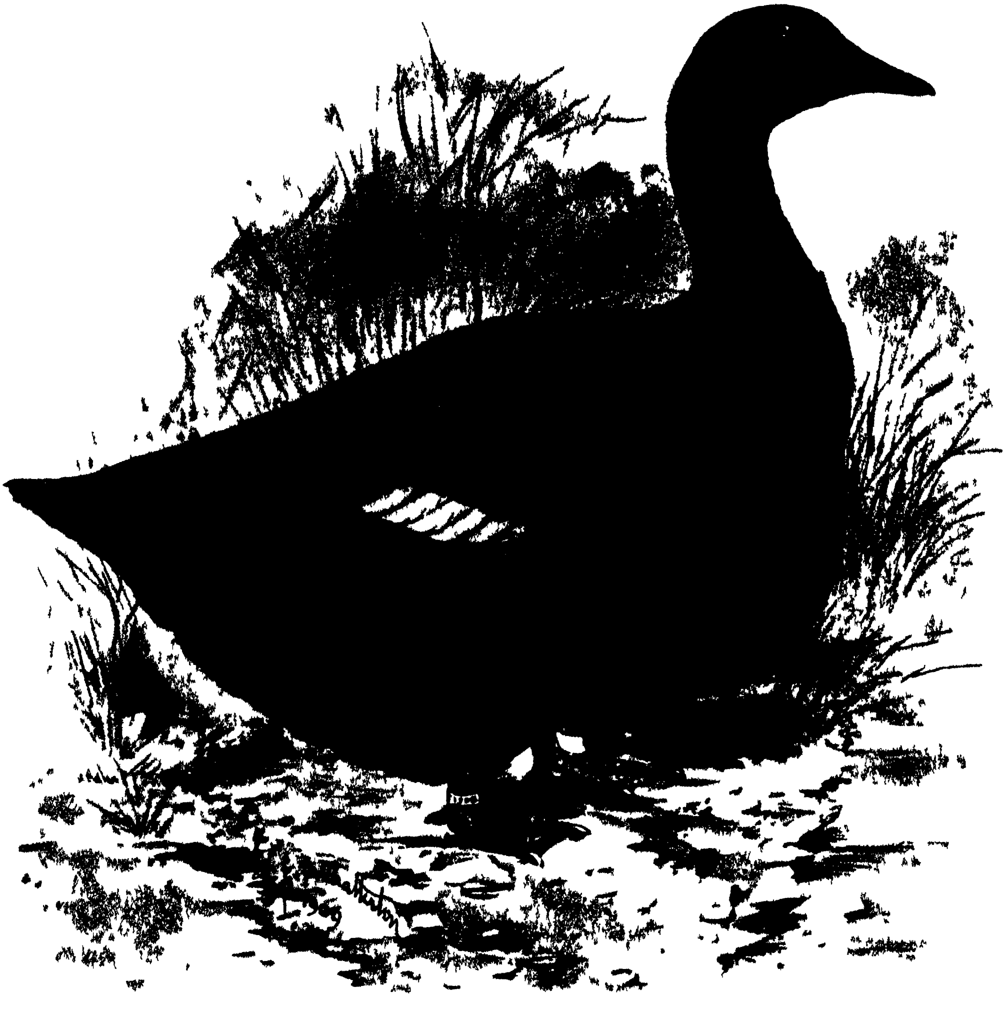
Shell-less Eggs.
This Picture shows nine Shell-less Eggs taken from a Hen after killing

Constitutional Debility. It is easily intelligible that a feeble or worn-out hen will not be able to perform her functions as satisfactorily as a healthy, active, young bird can. When Nature is weary and exhausted, the very first thing she does is to lose the power of reproduction; and in hens this means that the egg-organs become debilitated and unable to do what is required of them. Hence, the first sign is the stoppage of the lime supply, it is no longer secreted properly. There is no cure for this.

——**EGG-CRAMP.** This is a condition in which the afflicted bird is suddenly discovered by her owner to be unable to rise, owing to the fact that a sort of temporary paralysis has seized her legs. It most frequently occurs to young hens when they have only just commenced to lay. As is explained in another section, the oviduct is some little time before it becomes fully expanded so as to admit the passage of eggs freely, and there is no doubt that this cramp or paralysis is one of the results of the resistance at first offered by the strong walls of the oviduct to the eggs. The treatment of such a case is very simple. The hen must be kept perfectly quiet, and a dose of castor oil may be given by way of clearing the system generally; then the cramp will gradually disappear, and may never return. It may be added that although it is only usual for this malady to occur in young pullets, it does sometimes occur in older hens which have been laying too rapidly, and consequently have weakened themselves, and are more or less physically exhausted.

As a general rule, a bird which has once had this trouble will get periodical attacks of it, due no doubt to the state of the nerves surrounding the oviduct. It is, therefore, an open question whether such a bird should be kept, because there is always a danger of this leading on to further trouble, and the probabilities are that she will ultimately succumb to some form of local inflammation.

PLATE NO. 35



Cayuga Duck.

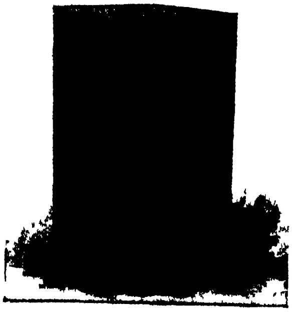
(*Bred and exhibited by Dr A Barry Sykes Manor House Formby Lancashire*)

Winner of 1st Waterfowl Club Show Manchester and Crystal Palace only times shown (This bird is considered a perfect specimen of the variety possessing wonderful beetle green lustre combined with rare quality size and trueness of type)

——**EGG-BINDING.** Egg-binding arises principally in two ways — either the egg passage is too small to permit the passage of the egg or the egg has become broken, and will not slip out properly in consequence. Parenthetically, it may be remarked that the latter is the more serious case. Now, it has already been observed that young and old hens are most liable to this egg-binding trouble; and the explanation is that in young hens the oviduct has not become sufficiently dilated to enable them to pass their eggs freely until they have been on the lay for some time, whilst old hens are predisposed to lay abnormally large eggs—double yolks often finding their way from the ovary into the oviduct—and of course, there is in their case, too, the natural weakness of age, which nowhere becomes more apparent than in their egg-organs. The oviduct of a pullet when she first begins to lay is but a narrow passage, and the first few eggs will not find their way through without causing the bird considerable pain and difficulty. Every poultry-keeper is aware of the fact that a pullet's first eggs are long and narrow, and, as a rule, more or less streaked with blood. The reasons are obvious : the resistance of the narrow passage makes the egg long-shaped and the rupture of small vessels as it forces its way through and distends the passage accounts for the blood-streaks. The first egg always shows these characteristics in their most pronounced form, the second and third less so, and then gradually the eggs become rounded instead of long, showing that the oviduct has been stretched to its normal capacity.

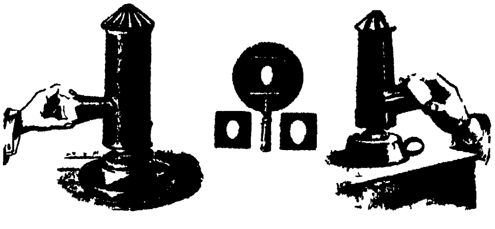
Coming now to the question of giving relief, it may first be observed that when a hen is egg-bound she will generally spend a great deal of time on the nest, or in going to and from the nest, and when she is tired of that she will be seen moving slowly about in evident distress, trying every now and then to deliver herself of the egg. The first thing to do is to ascertain whether the egg is intact or broken. If intact, it will be of abnormal size (unless for some reason there is inflammation in the oviduct, and then even an ordinary-sized egg will be only laid by effort and great pain), and it can readily be felt, as a rule, close to the vent ; but, if broken, then some of the contents will in all probability, be seen exuding from the passage. If this should unfortunately, be the case, the greatest care will be needed to prevent a catastrophe, for escape of egg-substance may set up inflammation and gangrene, and peritonitis will speedily ensue, followed by death. The first thing to do in such a case is to draw out most cautiously any portions of the broken shell. Before attempting to do so, however, the operator should gently insert into the vent a feather liberally soaked with sweet oil. As a rule, it is only necessary to get hold of a piece of shell, and then this will be attached to the rest (though cracked), and by very gentle effort the whole can be drawn out. Afterwards the hen should have a good strong dose of castor oil, and she should be kept quiet, though not cooped up, which means that she should be put into a small run by herself, where she will be free from interference on the part of the other fowls.

——**PROLAPSE.** Prolapse, sometimes termed " down-behind," is a well-known condition, in which a portion of the intestines protrudes. It is due to straining, and most often happens to hens that have been over-laying. The only thing that can be done is to gently oil or " vaseline " the part, and carefully re-insert it. Having done this, put the patient into a hospital pen, and keep her there for a week or more, only giving a moderate allowance of food, in order to check the production of eggs for a time. It is, of course, most necessary that this latter object should be achieved, because the whole tendency otherwise will be for the weakened part to burst out again. Sometimes a hen will fall a victim to this trouble after laying an abnormally large egg, probably because the egg-passage will have been so much extended that it will not, so to speak, settle into place again all at once. But it will do so by degrees if she be kept quiet and undisturbed.



Egg Tester *(Cyphers)*

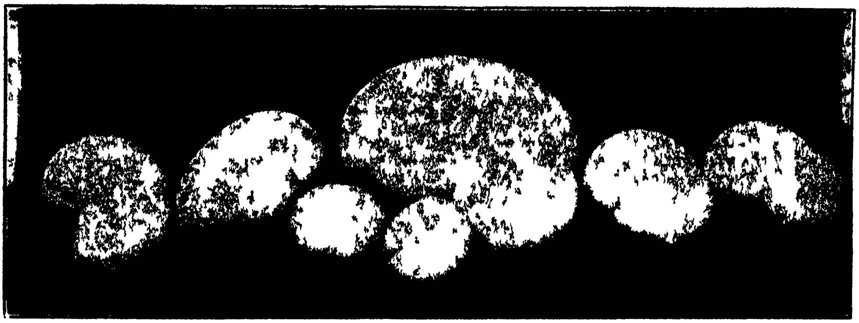
EGG TESTING. Eggs are tested for two purposes, either by the dealer to discover their relative age and freshness, or by the breeder to discover their condition during incubation; and any of these points may be approximately determined by holding them before a sufficiently strong light. Testing lamps of simple construction are generally used in an otherwise dark room, the light from the lamp showing through an opening before which the eggs are held in turn. For table purposes the external appearance of an egg tells something regarding its age, but not all. There is an unmistakable bloom or freshness upon the surface of a quite new laid egg, which is lost with handling, so that its absence is not sufficient proof that an egg is not new laid; and it must be held before a light in order that the internal evidences may be disclosed—and they are sufficiently conclusive. The air space increases in size with the progress of condensation and evaporation in the contents, and this loss of bulk and increase of air within the shell commences from the time the egg cools when laid, and although small at first the air space increases steadily with the age of the egg until in a very stale specimen it may occupy nearly half of the interior. The appearance of an absolutely new-laid egg, when held before a light, should be quite clear and translucent, with only a very small air space at the broad end. In regard to incubating eggs, the usual method is to test them at about the end of the first week of incubation, and the process is often repeated at the end of the second week. If, however, they are only tested once, the tenth day is perhaps the most satisfactory period, because in the case of dark-shelled eggs it is difficult to tell a live germ from an addled egg before then; and at about that time the fertile eggs will be found to have darkened a considerable portion of their contents, so that there is not much risk of mistaking them. If a sufficiently strong light is used the fertile eggs will exhibit a reddish tinge. Addled eggs may be detected by their cloudy appearance throughout, and the usual presence of dark spots; whilst infertile eggs will be as clear as when first put down for incubation. Relative to the period of testing, the spider-like appearance of a strong live germ may be sometimes visible at the end of the third day; but the later date is preferable, at any rate until the operator has become expert—and even in that case, the seventh day would be quite early enough to be safe. In the acquisition of knowledge, it is a good plan for the novice to break a few eggs after testing, in order that he may become



Various Styles of Egg Testers.

better acquainted with the internal conditions resulting in the several appearances of the eggs before the testing lamp

There are several important reasons for the testing of eggs during incubation, and it will at once be apparent that it is better for the living embryos that the addled eggs should be removed from their neighbourhood, the removal of the infertiles being of equal importance--the addled disseminating impure gases, and the infertile rendering unequal the temperature of such fertiles as they are in contact with Moreover, it is often possible to bulk the fertile eggs under some of the sitting hens, giving fresh batches to the remainder, and it must be remembered that the clear infertile eggs, tested out from incubators or hens, are quite fit for use in cooking—so that the economical reasons for testing are numerous



Eggs of Black Leghorn: Showing Diversity in Size.

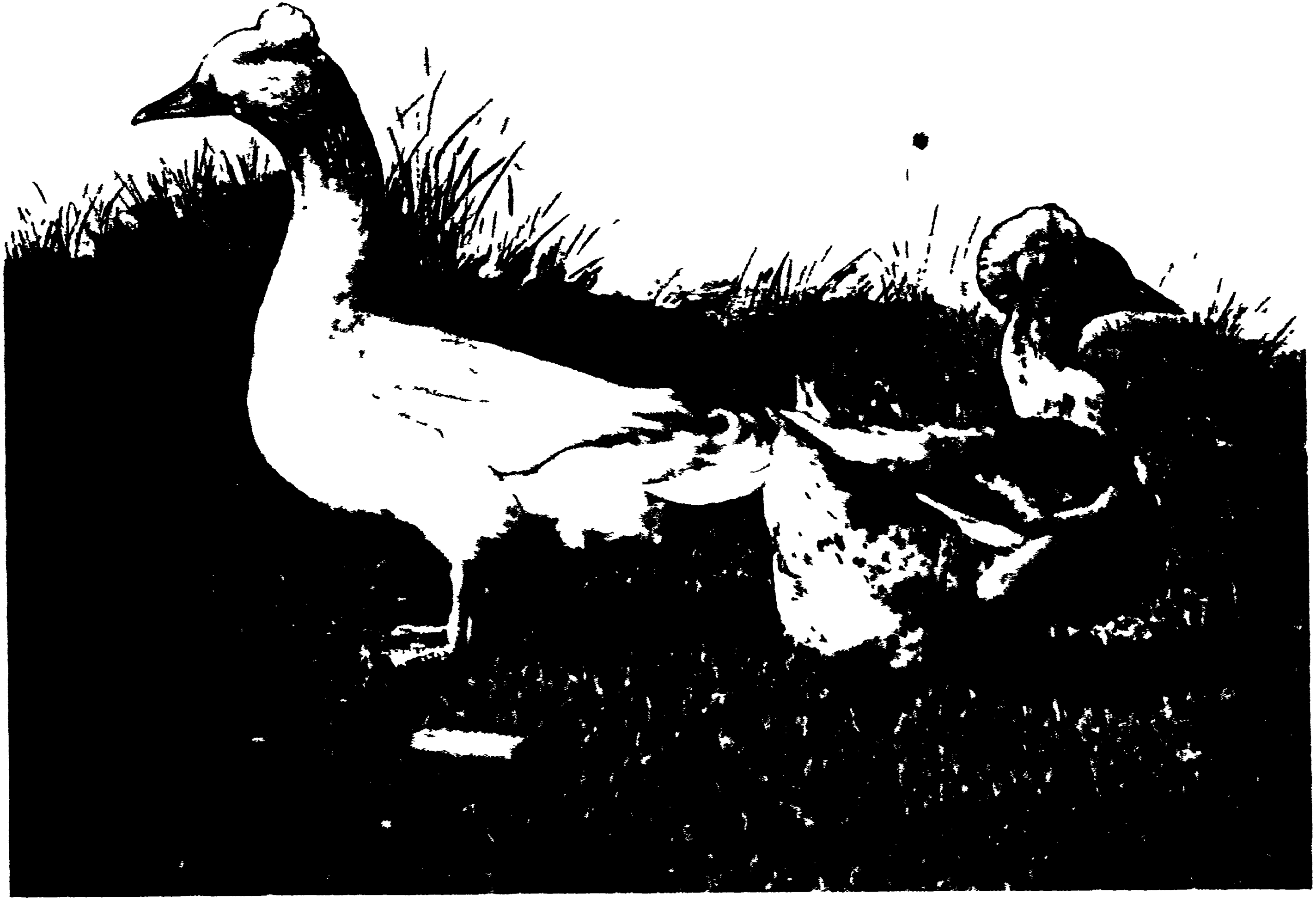
EGGS. STORING AND PRESERVING. A reference to the Tables of Average Prices in another column will serve to emphasize the general statement that the supply of eggs is very unequal, with the result that they are, broadly speaking, valued at double their summer price when marketed in the winter They are plentiful enough in spring and during part of the summer, but the barometer of quotations indicates their falling away during the autumn and winter As a matter of fact a winter production is contrary to the original economy of Nature, and although under domestication it has been found possible, not only to increase the total production, but also to induce a certain winter output, this latter is by no means as general as it might conceivably be under a more widespread knowledge of the essential conditions of management At the present period of progressive production, with the demand and value so much greater at certain seasons than at others, there is a very considerable opportunity for the disposal, in times of scarcity, of eggs, that have been sufficiently preserved in times of plenty, and in proportion to the extent of the adoption of such methods there will be a tendency towards equalization, which should at any rate be sufficient to raise the level of the producer's annual average of prices It must, however, be understood that, although by preservation the natural deterioration of the contents may be sufficiently hindered for practical purposes of sale and consumption, they should not be offered as "new-laid", although by being sold for what they are they invariably make prices which show a considerable margin of profit, and in the great majority of cases, this would not result from their sale at the time of production, when, being plentiful, prices are so generally unremunerative

Various methods have been employed in the past with more or less of success, but chiefly for the regulation of the producers' home supply, and it was not until comparatively recent years that any real effort has been made to preserve eggs for commercial uses. As an outcome of this modern tendency a number of experiments have from time to time been made, with the result that as a preservative water-glass has practically taken the place of lime-water, although the latter is in many cases retained and is the next best after water-glass. In addition to these methods, which are, of course, suitable for the treatment of eggs in either large or small quantities, an extensive use has been made (particularly in America) of the cold storage system.

——**NECESSARY CONDITIONS.** In relation to the preservation of eggs by any method, there are certain general conditions that tend to greater success than if the storage is attempted without due regard to them. The first essential is that the eggs shall be perfectly new-laid when put into the preservative, and if they can be treated the same day that they are produced, so much the better, but the second day should be the limit. It will also be obvious upon reflection, that infertile eggs may be preserved in better condition for a longer period than such as have been produced from a pen of hens running with a cock bird, and anyone who contemplates preserving any number, would do well to bear this in mind; and also to run their fowls at full liberty, feeding them on sound grain, all of which tends to the production of eggs better qualified for keeping than those from birds treated differently. The vessels containing the eggs and preservative must never be stood in a warm situation, and it has been found that a store in which the temperature does not fall below 33 degrees or rise above 45 degrees, is very suitable for the purpose; in no case should the vessels be submitted to a higher temperature, or the eggs may suffer, despite the preservative. The putrefactive changes to which the contents of an egg are liable are primarily caused by exposure to air and by warmth, and as the absence of sufficient warmth to cause deterioration can only be effectually secured by cold storage, the practical producer is reduced to the alternative of excluding air by closing the pores of the shell; but if when this has been done the egg is still subjected to warmth the influence will still be inimical. It is usual, and necessary, when removing the eggs from a preservative, for use or sale, to carefully test them before a testing lamp. From about March to June are generally considered the best months in which to place eggs in a preservative, those produced in the hotter days of summer being less suitable for the purpose of preserving for any considerable period.

——**WATER-GLASS.** This is the name which is commercially applied to a solution of silicate of soda, prepared by dissolving the chemical in water. It is generally sold as a concentrated solution, and may be purchased of chemists or poultry appliance makers, at the approximate rate of 1/- for sufficient to make about six quarts of preservative. The strength of the solution usually recommended varies from about three to ten per cent, and experiments tend to show that three parts of the water-glass to ninety-seven parts of water is quite sufficient for all ordinary purposes. The method of procedure is to thoroughly mix the water-glass with the water some little time before the eggs are put in, when the eggs may be preserved in one of two ways; either by dipping for the acquisition of the protective film which will adhere to them, and then storing them upon suitable shelves; or by immersing them in the solution and leaving them there, and this latter is not only generally more satisfactory, but as a rule also more convenient. When withdrawn for sale or use, they will be found to be sticky, and must therefore be thoroughly dried before they can be properly handled or packed; before use it is as well to wash them in

PLATE No. 36



Crested Ducks.

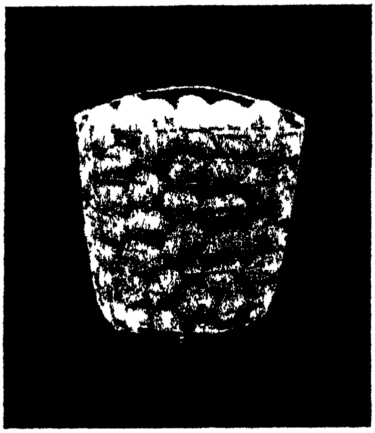
(Bred and exhibited by Mr R Scott Miller Greenoakhill Broomhouse, near Glasgow) warm water, and then pierce the shell with a needle set in a cork to prevent cracking in boiling. In mixing the solution, boiled water should be used, but the eggs must not be immersed until the mixture has cooled It is perfectly safe to preserve eggs in water-glass for six months, and they are often stored in this way for a much longer period

An Egg-Preserving Pail for Water Glass.
(W Tamlin)

——**LIME-WATER.** The use of lime for the preservation of eggs is a very old-fashioned method, and although water-glass is preferable for eggs intended for ordinary table purposes, lime-water preserves them very well for use in culinary operations The main objections to the lime-preserved egg is that the shell becomes rough, and that sometimes the delicacy of the flavour is impaired, otherwise the contents remain perfectly good after an immersion of several months Various mixtures or "pickles" have been advocated, but the one most commonly used, consists of the mixture of four parts of finely slaked lime with twenty parts of water, to which one part of salt is subsequently added The lime and water should first be mixed thoroughly, and left to stand, the salt being added about five days after, and the mixture will be ready for use at the end of a week, being then carefully poured off from the sediment of lime, which will by then have thoroughly settled at the bottom. The eggs should always be well covered with the solution, to which more should be added from time to time, if there is much loss from evaporation.

——**COLD STORAGE.** This can only be profitably undertaken in connection with a large trade, and is, therefore, employed by dealers rather than producers The method consists in storing the eggs upon shelves, and keeping the store at an even temperature, with a free circulation of fresh air, the temperature not falling below 33 degrees New-laid eggs stored under such conditions will remain in good condition for a considerable period, but the subsequent exposure upon removal to a different temperature, produces a rapid deterioration, and they must be used as soon as possible (*See* "Cold Storage.")

——**STERILIZATION.** A recently introduced method of preserving eggs is that known as the "Universal" process of sterilization, which is at once simple, quick, effective and very inexpensive



Wire Cage for holding Eggs to place in Pail.
(W Tamlin)

To take the cost first, in comparison with that involved in the use of water-glass: In a report relative to the latter, written by James Hendrick, B.Sc., F.I.C., and issued by the Aberdeen and North of Scotland College of Agriculture, it is stated that in dealing with a considerable number of eggs "the water-glass should not cost more than one-eighth of a penny per dozen eggs"; whilst the cost of sterilization is estimated to be about one penny per hundred eggs--so that the two methods are practically equal on the score of cost. One considerable advantage may, however, be claimed for sterilization, and that is that the method does not involve the destruction of the porosity of the shell with the consequent risk of bursting in cooking. This sterilizing invention involves no more trouble than the placing of the eggs in the sterilizer and removing them after treatment; with the assurance that they will remain in good condition for a period of from at least three to six months. Between their sterilization and use they may be handled, exposed for sale, shipped abroad, or stored under any ordinary conditions, retaining their natural flavour and having their nutritive and digestive properties absolutely unimpaired. The "Universal" sterilizer consists of an air-tight case, fitted with trays, and having a vaporizer attached—beneath which is placed a small spirit lamp, whilst at the top of the apparatus there is a ventilator. The same careful selection of eggs must, of course, be made as in any other method of preservation, and when the full trays are in position, the air-tight door is closed and the lamp lighted. Specially prepared sterilizing tablets are then dissolved in the vaporizer, the heat from the lamp evaporating them through an opening into the body of the sterilizer, and the powerful vapour penetrates the shells of the eggs so that it is impossible for putrefaction to take place so long as the contents are under the influence—which is from three to six months. The sterilizing air, with which the eggs are impregnated, evaporates under the heat of cooking, leaving the contents unchanged and as naturally fresh as when submitted to the influence. The time during which the eggs must be subjected to the treatment within the sterilizer is no longer than from about thirty to forty minutes.

- —**STORING FOR INCUBATION.** Contrary to the usual advice given in text books and other directions relative to the treatment of eggs prior to incubation, it may be asserted that the position in which they are stored is of no practical importance, unless they are kept at a high temperature or kept too long, which would, in either case, unfit them for the purpose, regardless of the position in which they are stored. The yolk being specifically lighter than the albumen, cannot sink, and it cannot rise owing to a weighting and balancing arrangement of a portion of the denser albumen, so that unless (by heat or age), chemical changes take place, the position in which the egg is stored, for the short necessary period, is quite immaterial. It is, however, necessary to prevent exposure to direct draught, and consequent undue evaporation, so that it is advisable to cover the basket or box in which they are stored with a cloth; having previously put the eggs in just as they fit, one upon another, without regard to one end or the other being uppermost.

EGGS, AVERAGE PRICES (*see* "Marketing.")

EGGS, IMPORTS (*see* "Imports.")

EGG TOOTH. A small horny protuberance on the upper mandible of a newly hatched chick. It usually drops off within twelve hours of hatching.

EGYPTIAN GOOSE (*see* "Geese.")

EMBDEN (*see* "Geese.")

EMBRYO. The young of a fowl in its earliest stages of development (*see* "Incubation, development of the embryo.")

EMPHYSEMA. Emphysema is a complaint which more often occurs amongst pigeons than amongst poultry, but it does occur now and again in the poultry yard, and consequently the poultry-keeper should be able to deal with any case that arises. The complaint is shown by a swollen condition of the skin round the neck—the skin being lifted up and inflated almost like a balloon. The cause is to be found in lung trouble—the air escaping (through the rupture of some of the air-cells) from the lungs into the tissues surrounding the lungs. Such trouble usually results from an accident—for example, an external blow which may rupture some of the tissues of the lungs, or by any cause which will induce swelling and pressure from the ribs. Now, obviously, a bird whose lungs are in an unhealthy state, as from want of proper ventilation in the roost, or by reason of some hereditary lung trouble, causing disruption of some of the tissues, will be the most likely subject for an attack: and in such an event the results are likely to be serious—blood poisoning being most likely to supervene very quickly. This, indeed, is the direction in which danger may be anticipated in these cases, and although the only treatment necessary consists in puncturing the bladder-like swelling to allow the air to come out, it is important to use the utmost care in doing so, and to apply antiseptics afterwards lest the same result may occur. A bird, again, which has once suffered from emphysema, as the result of a blow or some similar accident, will be liable to lung trouble for some time afterwards, owing to the dislocation or rupture of the air-sacs—and such a bird is, therefore, not worth keeping, unless it be one of considerable value. It may be added that emphysema is sometimes mistaken for tympanitis, or inflammation of the crop due to the decomposition of food, and the consequent formation of gas which distends the crop. Such decomposition may be the result merely of indigestion, pure and simple, or it may be brought about by some form of crop-binding—as when something solid becomes wedged in the passage from the crop, preventing the food from passing on. In any case, the proper treatment for tympanitis is to give a dose of castor oil and prick the inflated crop with a needle to allow the confined gas to escape—even if it does not become necessary to treat as for crop-binding (which see).

ENEMIES OF FOWLS. In a wild state the balance of nature is, if one may so employ the word, automatically preserved, and although the Jungle fowl is exposed to the attacks of eagles and other native foes both furred and feathered—it is also provided with some measure of protection in its power of flight. One result of domestication has been to introduce fowls to very dissimilar situations, and to some extent to expose them to the attacks of other enemies, and a further result has been the modification of their habits, the curtailing of their powers of flight, and in some particulars their defencelessness is intensified by degeneracy. Moreover, in some instances, the fit are quite as subject to attack as the unfit, so that the general responsibility of defence is thrown upon the keeper of domesticated fowls, and in no circumstances of poultry-keeping is there absolute immunity from the possible depredations of some foe. The farmer is, owing to the natural conditions of his surroundings, the most heavily handicapped poultry-keeper in this connection, his undertaking being hindered not only by such birds and animals as are supposed to be inimical to other interests, but he is further open to the havoc wrought by foxes—which it is the interest of some to protect and preserve. The moral and financial aspects of the fox question have been from time to time very keenly, and often bitterly, discussed ; but it is no part of the present purpose to detail the various arguments for and against the ancient and typically English sport of fox-hunting, in its relation to altered modern economies. It may, however, be permissible in a work of this character to express the opinion that equity demands the full compensation of an industry for damage done in the name of sport, or the reservation to those engaged in the industry of their right to protect themselves to the fullest extent, and their ability to do so without running the risk of collateral injury at the hands of those whose interest is all on the other side. Without a real fixity of tenure the farmer is not sufficiently independent to deal with the subject, as a poultry producer.

—— **FOXES.** As things are at present in the rural districts of Great Britain, the interests of the farmer are generally conflicting, and in the majority of cases the poultry-keeper is fain to accept the amount offered in compensation, and to maintain a cheerful face in front of a hunting landlord. Nevertheless, whatever the private opinion and inclination, the countryman who aspires to keep poultry profitably must neglect none of the precautions which remain to him—short of giving offence where he must perforce find favour. Except for the proportion of foxes that are in some districts turned down after some period of acquaintance with buildings, these animals do not as a rule do much daylight raiding, their natural habit in this respect being nocturnal. It is, therefore, obvious that safe fowl houses only should be used, and that the hour of shutting the fowls in should not be too late. In this respect farmers are often very careless, and in no small degree contribute to their own loss ; and this, in cases where compensation is demanded and received, is scarcely creditable.

——**WEASELS.** The weasel gives its name to a family of which it and the stoat are numerically the strongest, and the members of the group in general are among the most bloodthirsty and destructive of the many enemies of poultry. The polecat, which is practically a wild variety of the ferret, is now only found in a few remote districts, and the poultry-keeper has to thank the game-keeper for its extirpation from most cultivated parts of the country ; so destructive is it of all that man wishes to preserve in the way of game, that it has been so relentlessly killed as to make the appearance of a polecat somewhat of a curiosity. Nevertheless, it must be credited with the virtue, common to the whole family, of being a wholesale destroyer of voles, rats and mice, as well as game and poultry. This characteristic of the weasel tribe is a factor worth consideration in relation to the balance of nature, which man so frequently upsets in his destruction of some species which is also the foe of some common enemy. The countryman is, therefore, in the position of having to decide whether he suffers more damage from weasels and stoats than he is likely to do by the increased numbers of rats, consequent upon the disappearance of their very active enemies. Stoats and weasels, both in their dealings with birds and rodents, are very wholesale in their methods, slaughtering from sheer love of bloodshed and out of all proportion to the more legitimate satisfying of the cravings of hunger. A common method of trapping these creatures is by the setting of a trap in a drain pipe or tunnel, near a gate or the bank of a hedge—in the manner understood by any countryman ; or there is the alternative of a shot-gun and patience.

—— **HEDGEHOGS.** This small animal is usually suspected by the countryman of a variety of impossible crimes but apart from its admitted fondness for eggs (which more often affects the game keeper than the poultry keeper), it is not only harmless, but extremely useful as a persistent destroyer of worms, slugs, snails, frogs, snakes and many insects; and it is included in this place, not because it is an enemy of fowls, but in order to some extent to clear its character and prevent its wanton destruction at the hands of thoughtless poultrymen.

—— **RATS.** So familiar are all poultry keepers with the depredations of the rat, that very little need be said under this head. The rat is such a universal enemy that it cannot be for the common good to exterminate such animals and birds as prey upon it. Apart from the usual methods of hunting, trapping and poisoning—and the latter is not always possible—the poultry breeder can do much in the way of protection by a judicious use of very small mesh wire-netting, and concreting and cementing the floors of roost houses; but in the latter event a suitable bedding, such as peat moss, must be used to prevent injury to the birds when alighting from their perches. For the proper protection of coops, good use may be made of netting as a covering for the portion which should always be open for ventilation, and when bottomless coops are used in field rearing they may be set at night upon an old piece of sacking with a length of wire netting beneath.

——**CATS.** Cats are chiefly troublesome in and around towns; country cats of poaching proclivities invariably get shot. Very small chickens may, of course, be protected by wired-in movable runs of a suitable size, or a larger space, enclosed with wire-netting six feet high, will practically be cat-proof. A brick wall may also be rendered impassable by a strip of netting so fixed along the top as to project on either side, and any cat that does gain admission to an enclosed yard, may be effectually treated with a garden hose—she will never return when once liberated.

—— **HAWKS.** The danger from feathered foes mainly concerns the country poultry keeper, and he is in some situations frequently a heavy loser, the enemies including: the falcon, buzzard, kite, kestrel, sparrow hawk, raven; and in another category the members of the crow family. Hawks are very commonly troublesome in country districts, but naturally more so in some parts than others, and having once robbed the rearing ground, they will continue their depredations with considerable pertinacity, their watchfulness and perseverence being very often much more lasting than that of their would-be destroyer, who lies in wait for them with a gun. It is, however, necessary to discriminate between hawks and hawks, the sparrow hawk (which does not hover) preys upon small birds, pigeons, game birds and chickens; whereas the kestrel (which does hover, and is also called the windhover) lives chiefly upon rats, voles, mice and various insects, and only very occasionally attacks a chicken or young game bird.

—— **CROWS.** In the same way a distinction must be made as regards crows and rooks. The former will cheerfully and constantly rob the rearing grounds of the poultryman and the gamekeeper, but the latter prefers an insect dietary, varied with some toll of corn. There have been instances, however, in which rooks have taken to chicken killing, but it is against their common natural habit, and has been shown (by the observant) to be the result of an accidentally acquired habit, rather than a natural inclination; moreover, such a habit is seldom acquired unless a rookery is allowed to become over-stocked, and there is in consequence a keener struggle for existence.

It will be seen from all that is written above that the enemies of poultry—beasts and birds—all have a lawful and useful place in the economy of nature (unless, perhaps we except the rat, whose virtues are rather obscure); and that by domestication we have created artificial conditions and upset the balance; yet we very often make matters worse in our endeavour to preserve the species we have domesticated, so that any enterprise of destruction should be preceded by a general weighing of the arguments for and against the attempted reduction or extermination of the particular enemies under consideration.

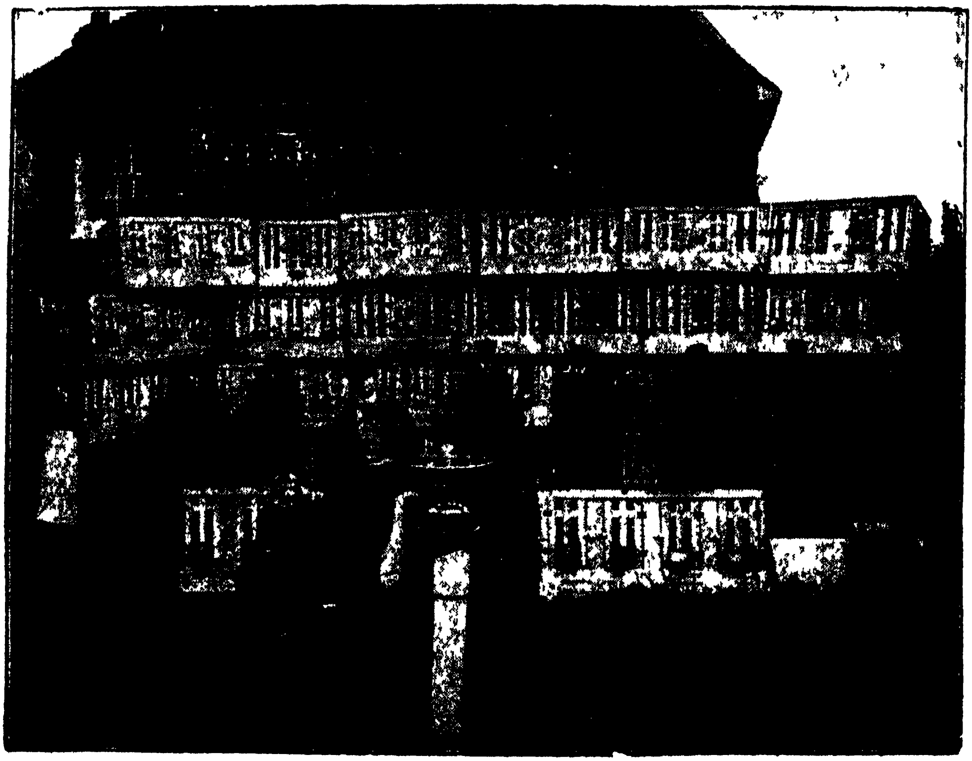
ENTERITIS. Enteritis is a form of bowel complaint that is responsible for a great deal of mortality amongst poultry. It is difficult—in fact, impossible for the amateur—to distinguish between enteritis, dysentery and cholera, as the symptoms are so much alike, and the treatment suggested under those headings is applicable to enteritis also. Enteritis must be dealt with, however, under a separate heading, because it is epidemic, and might often be prevented from spreading if only proper measures were taken. It is not difficult to understand how an epidemic of enteric disease may be (and in fact, often is) brought about. Take the case of a number of chickens all running together in hundreds, perhaps. Sour food is given to some of them; it sets up diarrhœa. Their brooders or chicken houses are not kept in a sanitary condition; some of them have been bred from parents tainted with tuberculosis, and the effects of the sour food turning to diarrhœa is to set the tuberculosis which is latent in their system into active operation while the effect of the want of sanitation in the coops is to cause the complaint to spread to many other birds. This is the beginning of an outbreak of tubercular enteritis—tubercular disease affecting the intestines. Similar results may be produced by want of cleanliness about the drinking vessels. These should always be kept absolutely clean and sweet, which can only be ensured by frequently cleansing them. Drinking vessels should be made of stoneware—not earthenware, the latter being more or less porous and so liable to retain germs of disease. Enteritis may also be due to the fowls drinking from some poisonous or tainted water supply. It is astonishing what filthy water animals and birds are able to drink, and it is often a matter of surprise that more disease is not caused in this way. But it is not so much dirty water as food or drink tainted with tubercular or other disease that is the cause of trouble; and a feed of bad meat or offal tainted with tubercle, is more likely than anything else to start tubercular enteritis. Sometimes, however, the poultry-keeper has to deal with one of those mysterious outbreaks that will put in an appearance even amongst healthy stock. In that case he must at once remove the affected birds (if there are a number of them affected) to fresh ground, where they are necessarily free from the contamination, and treat as directed under "Dysentery."

EXHIBITION HAMPERS (*see* "Shows and showing.")

EXPORTING LIVE POULTRY. The demand for English poultry in our Colonies and foreign countries is rapidly increasing, material progress being reported each year. At one time a foreign order for fowls was looked upon as giving a great deal of extra work, and the unfortunate purchaser was frequently kept in suspense waiting the arrival of imported stock. No doubt the chief cause of these delays was to be found in the action of the shipping companies, as they were then not over-anxious to take live poultry, and their charges were very high. The birds generally did not receive the care and attention that is necessary during the voyage, the result being that sickness and mortality was a common occurrence, falling hard upon the unfortunate purchaser, who often found the male bird dead, rendering the hens useless for breeding, and leading to a waste of a whole season. Probably, however, the unsatisfactory way that birds arrived at their destination could be quite as often traced to the sender. The rough and unpractical way in which the fowls were packed accounted for a large number of deaths on the voyage. Frequently birds were packed in an ordinary wooden box, having only wooden rails or wire netting on top, with no other covering, with scarcely room to turn round. Too much stress cannot be laid upon the necessity of providing suitable and specially-made coops, which must in all cases be light, strong and airy. It is not generally known that the coops, with the exception of those going to North America and Canada, are always placed on the upper deck, exposed to all weathers, and as they have to be firmly lashed to prevent moving with the rolling of the boat, and also from being washed overboard, they must be made strong, with good water-tight roofs. The floor should be at least two inches from the deck, by allowing the quartering at each corner to act as legs. This permits a free passage for the water when the decks are being washed down, and keeps the floor of the coop dry. The front and back of the roof should project three inches, which will prevent the sides from becoming wet, and the roof should have a three inch fall. A blind made of good hessian should be fitted, which can be rolled up when not in use and supplied with fasteners to prevent it from getting blown off when let down. Weight is a great consideration, particularly when the coops have to travel a long distance by rail, waggon or on the heads of natives, after the arrival at the nearest port. This can be greatly reduced by using strong hessian round the sides and back of the coop and a nine inch board to run length ways from the floor, which keeps the bedding dry and prevents the fowls scratching it out in the front. Slats or rails are best for the front, firmly nailed and placed two and a quarter inches apart. The doors can be made of slats or wire netting, and should be in the centre of the front of coop, above the nine-inch board, and must have a strong fastener attached. In cases where the coop has divisions for male birds to be kept separate, a board at least six inches wide should be used to run up and down in front of the division, as this will prevent the cocks from fighting when they put their heads out of the slatted front. Great care should be taken over this, as many good birds are badly damaged during the voyage from the neglect of this important item. The division should be made of hessian with several rails across to support it, fitting closely up to the roof of the coop, and firmlv tacked all round to prevent any sagging, where the cocks would fight through. The floor must be covered with two and a half inches of fine peat moss, with a few double handfuls of straw chaff thrown in. Never use ashes or sand as bedding, for this greatly increases the weight and if it should get wet, is harmful for the birds to be on, and the food gets tainted. The size of coop should vary according to the length of voyage and kind of fowl. It is not advisable to place the male birds with the hens for several reasons, the chief

A Shipping Coop. (*Meech*).

being that when the birds are in such confinement the hens frequently peck the cock's comb to such an extent that they will make large holes in it, often causing it to fall over, and the bird loses a great deal of blood, making him arrive in a weak condition and totally unfit for breeding purposes. Therefore, separate partitions for the cocks are necessary. These vary in size and should not be less than two feet deep and fifteen inches wide. For two pullets allow eighteen inches wide, and for six three feet wide by two feet deep. The height must be governed by the breed, but when the coops only contain hens two feet front and one foot nine inches at back (inside measurements) is high enough, whereas, if a male bird of a high comb breed is in, the coop should be not less than two feet five front and two feet two at back. A good sized galvanised drinking trough to hang on the outside of the front of coop should be sent, one for each compartment. The next very important item is the kind of food for use during the voyage. Unless the consignment is accompanied by a special attendant, it is better to send only grain of the very best kinds; practical experience shows that the birds then arrive in far better condition than when meals are sent. One reason is that the man usually allotted to attend the birds going out is not experienced enough in the mixing of meals in the correct way; it will generally be thrown upon the bedding, to which it at once adheres and is injurious to the birds' health. As with the exception of very long voyages of from five to



A Consignment of Fowls ready for Shipment, showing a good style of coop (*W H Cook*) seven weeks, the coops are never cleaned out, the meal comes in contact with the droppings, which causes considerable harm to the birds.

The best grain to use is half wheat and half short full white oats, never forgetting to add to this a certain amount of oyster shell and sharp flint grit. The two latter are most important items, and keep the birds in a very fit condition during the whole of the voyage. Instructions as to feeding should be sent to the shipping company, who will hand the same to the one entrusted with the care of the birds, stating that each bird is to have an open full single handful of grain twice daily, a plentiful supply of water, and that any green food that can be thrown into the birds during the voyage will be appreciated by them. If they are destined for a voyage of a month or more, a bag of bedding should be sent, otherwise when the coops are cleaned out, only ashes from the stoke hole will be available to replace the peat moss and cut straw. The writer has accompanied fowls on a fifty-seven days' voyage and landed them in as good or better condition than when they were shipped. Birds are often exhibited, and win prizes, within a few days of their arrival after a long sea-voyage, which goes to prove how satisfactorily exporting poultry may be carried out in a practical way. The photograph illustrating this article should greatly assist the reader as to the style of coops the birds travel in.

EYE INJURIES (*see* "Accidents.")

FACE. The skin round the eye, devoid of feathers.

FAKING (*see* "Trimming.")

FANCY, THE. The poultry fancy comprises that section of poultry-keepers who breed primarily for exhibition or fancy points, and the name fancier is generally used to denote those who are interested in this particular phase of poultry keeping. Though it is difficult to estimate the extent of the fancy, it is undeniably upon the increase, large numbers of recruits being attracted to this fascinating pursuit year by year, and though it should be properly regarded as a hobby, nevertheless a number of successful breeders make it pay handsomely, and the richest returns in poultry farming have been secured in this particular branch. That has come about in this way: As the fancy has grown and competition become more keen, owing to the increased number of shows and prizes, the value of exhibition specimens has gone up by leaps and bounds. The highest price ever paid openly for an exhibition fowl in this country, was £200, which the late Capt. Heaton gave for a Black-red Game Cockerel, at Birmingham Show, while at the International Show, Miss Rilot purchased a Partridge Wyandotte cockerel for £165. Other high prices, ranging from £20 up to £100, are constantly being paid for high-class specimens, both publicly and privately, and the more popular a breed becomes, the higher rises the value of good show specimens. To successful breeders, therefore, is presented the opportunity of reaping a rich harvest, and there are many persons of this class, who have become professional fanciers, and sell some hundreds of pounds' worth of stock in a year. While they dispose of a limited number of first-class show specimens at high prices, they sell a very great number of inferior birds of all values for breeding purposes, and in the spring of the year an extensive trade is done in sittings of eggs, which are readily sold by the more successful breeders, at prices ranging from one guinea to three guineas per dozen. Little wonder, then, that the fancy continually attracts so many new recruits, since there are other inducements, beyond the mere pleasure of breeding show specimens. Poultry fanciers may, however, be divided into three sections: (1) those who breed and exhibit for the pleasure and interest it affords, often at considerable expense, since a great many employ expert poultrymen, and spare nothing to secure some of the most perfect specimens in the country; (2) those who breed and exhibit entirely for business purposes; and (3) the amateurs and beginners, from whom the ranks of successful breeders are recruited, the genuine hobbyists of limited means, and those who regard the keeping of fancy poultry as an interesting pursuit, with the possibility of making it pay a little more than the bare expenses. Among the latter there are, of course, a great number who cherish the ambition to become successful professional breeders, while many more are, for various reasons, compelled to operate upon a small scale, and are, therefore, hindered from making the fancy anything more than a profitable hobby even at the best.

To those who look for monetary rewards in the fancy, experience, skill and business ability are essential. The great thing of all, of course, is to know how to breed the best specimens, and as this knowledge is only acquired as a result of practical experiments based on sound instinctive knowledge, it naturally follows that the ranks of the great breeders comprise the most experienced and practical men in the fancy. For this reason it will be understood that the adoption of fancy poultry farming as an industry by inexperienced persons is a very risky proceeding, and it is a great mistake to suppose that, because a few successful breeders make handsome incomes, anyone else can attain the same results merely by devoting themselves to the business. Many have tried, and have paid large sums in order to secure good stock to commence with, but it has invariably transpired that, even though one may purchase the best birds in the country, the real test is in the breeding, and that is where the comparative beginner always finds himself beaten. In nearly all cases where fanciers are now reaping rich rewards from their poultry, it happened that they commenced breeding in a small way. Many are farmers, and began by keeping pure-bred poultry and improving them as they became more interested. Others are business men who began by keeping fancy poultry as a hobby, and gradually devoting more time and attention to it as it developed into a profitable, as well as fascinating, industry.

There are, however, other means of attaining a high position in the fancy for those who possess the means to make it a serious hobby. At the present time there are a great number of wealthy fanciers to whom the breeding and exhibiting of fancy poultry is a perpetual source of amusement and interest, and to whom the heavy expenses of maintaining an elaborate establishment and a staff of helpers (generally an expert poultryman, and one or two assistants) is only repaid by the enjoyment provided. Those who are able to take up fancy poultry keeping in this way generally commence by securing the services of a qualified poultryman (that is, a man who has had many years' actual experience of breeding and exhibiting), and as so much depends upon him, he is generally selected for his knowledge of the particular breed or breeds which the fancier intends to keep. The next business is to secure some of the best stock obtainable, and the poultryman's knowledge is here valuable in selecting the most suitable birds, both for breeding and for showing. The result from that time forward depends equally upon the poultryman's skill and his employer's preparedness to spend money. In these days, when competition is so exceptionally keen, the fancier who would win cups and prizes at the best shows must be prepared to spend freely, at any rate, for the first few years, and if eventually, through his poultryman's skill, he is able to breed the best of his variety every year, he may reap a fairly rich return. There are, however, many such fanciers who are rather exhibitors than breeders, since they maintain large teams of show birds, which they buy at high prices for the sole purpose of sending round to the shows in order to win prizes. There are fewer possibilities of profit, and certainly less interest in this, than in the breeding as well as exhibiting of fancy poultry.

As a rural hobby the fancy has already gained a strong hold. Her Majesty Queen Alexandra has for some years been a fancier and exhibitor of Bantams, and among other well-known people who are engaging or have at one time engaged in this interesting pursuit, may be mentioned the Earl of Rosebery, Lord Rothschild, the Duke of Sutherland, the Countess of Derby, the Countess of Craven, the Countess of Home, the Countess of Aberdeen, the Dowager Lady Alington, Viscount Deerhurst, etc. In the North of England, the poultry fancy is one of the most popular hobbies for wealthy business men, and all over the country it is becoming more and more general.

The influence of the fancy and its bearing upon general poultry keeping, have often been grossly exaggerated, and the services of fanciers have seldom been fairly recognised. It is far too commonly declared that the fancier is spoiling the pure breeds of poultry. This complaint comes, of course, from a small section of utilitarians, who obstinately refuse to recognise any other purpose for keeping poultry than that in which they are interested. They studiously ignore the fact that the fancier has created all the popular composite breeds that find so much favour at the present day, that he has also set examples in the breeding and management of poultry that have proved invaluable to utilitarians, and that he has played a prominent part in building up the great industry of which the fancy forms a part. Nor does the intolerant critic realize the fact that some of the hardiest and most productive stock in the country are to be found among fancy strains, and that the skill of the fancier has enabled him to promote size, vigour and prolificacy as well as exhibition points. At the same time, fancy breeding must remain the higher art of poultry keeping, and a thing apart from the ordinary utility work, because the objects aimed at are so different, though not necessarily opposed. The fancier (as will be seen on referring to the section "Breeding for exhibition,") aims for the standard characteristics, and though he may be, and is, glad to incorporate laying traits as well, there is no question of choice between a good breeder and a poor layer, or a poor breeder and a good layer, since the fancy traits are so much more valuable to him. For this reason we cannot help thinking it would be far better if the critic, instead of vilifying the fancier, would recognise the splendid results he has achieved, and seek to apply some of the fanciers' methods for his own uses and his own ends, as many of the more advanced utilitarians are now doing. The morals of the fancy are better than they are generally represented. The critic would represent that the fancy is wholly immoral, but then he knows nothing of its inner life, and those who have worked for years in the fancy find cause to wonder at its comparative immunity from undesirable practices, and the high standard of honour existing among fanciers, considering that there is no powerful governing body to regulate affairs. The Poultry Club and the specialist clubs (*see* "Clubs, Specialist"), though not thoroughly representative, nevertheless have considerable influence in checking dishonourable practices, and if there were wanted further proof of the clean state of the fancy, it is to be found in the fact that an honourable reputation is the most valued asset of the fancier.

The fancy may also be described as the social side of poultry keeping, since it provides so many opportunities for social intercourse and leads to the making of so many friendships. It is, moreover, the means of circulation of a great amount of money, and other trades and industries are largely supported by it. Basket makers, printers, manufacturers of the more expensive appliances, and the railway and carrying companies are to a great extent benefited by the fancy, for it is estimated that something like seven hundred shows are held in the United Kingdom in the course of twelve months. These also give employment to a small army of penning attendants, while the manufacturers of patent foods rely largely on the fancy and the shows. It will thus be seen that the fancy has become a power—a power for good in promoting the breeding of standard specimens and the creation of new varieties, and not, as some would argue, an influence for evil in encouraging the elimination of useful qualities. It is to the fancy that we look for new types and varieties, full of vigour and prolificacy, and for the maintenance of the best features of our pure breeds.

FARM, PLACE OF POULTRY ON THE. There can be no doubt that the most economical, and, therefore, the most profitable form of poultry keeping for general utility purposes, is that carried on upon the farm; not in the old style, where the hens roosted in the cowshed and scratched about on the manure heap, but in the modern and approved method, commonly known as the colony system of farm poultry keeping. This consists of distributing the stock over the farm, instead of keeping them all within an area of fifty yards of the farm buildings, and the advantages of the plan are many and obvious. In the first place, the farmer can keep a largely increased stock if he is so disposed, and secondly the cost of feeding will be very much less than by the old plan where all that the birds ate had to be given to them, for on an open range fowls will pick up from one fourth to one half of their food, according to conditions, and if the farmer recognises this and orders his feeding with due care for economy and efficiency he will effect a great saving in the food bill. Thirdly, fowls on an open range are very much more healthy than those kept in a limited space. They develop more active habits, keep in better condition, and naturally give better returns. Fourthly, there is a great saving in wire netting, fencing materials and houses, compared with poultry keeping upon a small holding where the breeding and other stock have to be separately accommodated. A farmer can buy a substantial house to accommodate twenty-five to thirty birds for something like £3 or £3 10s., and that house will, with ordinary care, last for a number of years; whereas if the same number of birds were to be kept in confinement they would in all probability have to be divided into two flocks, with a house costing 35s. or 40s. for each, with perhaps a scratching shed in addition, and fencing material costing perhaps another 25s. to 30s. for each pen.

There is one more advantage in farm poultry keeping that is not generally recognised because it is not properly understood, and that is the improvement of the land by means of the light and even distribution of manure. There are plenty of farmers who still contend that poultry spoil good pasture land. Those people have obviously never put the matter to a practical test, or they would know how utterly opposed to facts such a contention is. Maybe it is based on the knowledge that if a large number of fowls are kept together within a limited area they will wear the grass down and foul the land. But it is quite a different matter when flocks of fowls are distributed thinly over the fields, and the houses are moved about and the birds fed in different spots, as they should be, so that the whole of the ground is lightly covered. When that method is adopted, we are able to assert from our own experience (and hundreds of practical farmer-poultry-keepers will bear us out) that the damage to the grass and pasture is infinitesimal, while the benefit to the land is real and substantial, as the following instances testify. Some years ago we took a meadow that had been sadly neglected and was badly overgrown with moss. We ran poultry upon it among other stock, rather more thickly than in ordinary cases, and by feeding the birds in different places we found that they scratched up the moss without damaging the grass, and at the end of three years the meadow was one of the best in the district. In another case a farmer of over 200 acres in the Midland counties took up poultry-keeping on the colony system upon the advice of an expert, and after four years declared that the rental value of his land was increased at least 5s. an acre. The same farmer dissipated the idea that other stock will not feed where poultry have been, by declaring that both cattle and sheep always followed the poultry houses as they were moved from place to place, and showed a preference for ground that had been run over by fowls. We have ourselves noticed that farm stock like to graze round about the poultry houses, for the reason that the young grass grows richer where the fowls have been. Again, there are numerous cases where the yield of hay has been greatly increased by running poultry upon the meadows. In such instances it is desirable to keep the fowls much more thickly upon the ground than would be advisable upon permanent pasture, and on some of the large poultry farms as many as two or three hundred fowls per acre are kept upon the ground from July on to well into the winter, and very heavy crops are cut afterwards. The effect of such a heavy manuring is felt for more than one season, and if there is plenty of ground to be covered it is not necessary to run poultry in large numbers upon the same meadow more than every other year. In addition to other advantages we may remember that the farmer-poultry-keeper accommodates his fowls rent free, for while the poultry-farmer on the small holding must charge rent directly to his fowls, the farmer's poultry run over ground for which other stock pay the rent, and, as we have seen, even contribute their quota to its improvement rather than detract from its value. Where a permanent house is kept in one spot the grass immediately round about it may become a little worn, and if the fowls are fed upon the same spot every day they will undoubtedly wear other patches; but that is opposed to the correct principles of farm poultry keeping, and if a farmer is so careless as to ignore the simple rules of management he must take the consequences, but he cannot fairly attribute what damage may occur to the general principle of running poultry on the fields. Houses on wheels are much to be preferred, and these can be moved twenty yards or so every week during the season when the grass is growing, so that no spot becomes worn, while the fowls cover the whole area and manure it lightly. Many estimates have been made regarding the number of fowls to the acre that can safely be run upon pasture land, but unless the farm is of limited extent we prefer to run the birds thinly, because the more ground a flock of fowls have to range over, the more food they will find and the less they will cost to keep. On comparatively small farms we consider a house containing about twenty-five fowls might be kept to every three or four acres, but it must be remembered that in such cases there is always danger that the flocks might mix, which would prove disastrous when breeding operations were being carried on. Moreover, though we do not consider that the birds would be thickly enough upon the ground to damage the pasture or spoil it for other stock, they would certainly not have the same opportunities of finding food, and could scarcely be expected to give such excellent results as fowls upon a large farm, where a flock might be placed in each field, or two in a field of more than twelve acres, if necessary.

We must not, however, ignore the advantages of running poultry over arable land when not in crop. The stubbles in autumn provide rich fare for poultry, and it is sheer waste of opportunities to leave the fallen grain to the wild birds. The practical farmer-poultry-keeper will bring two or three flocks of young birds on to the stubbles as soon as the grain is carried, and he need have no fear of running them too thickly upon the ground, for during the short time they remain there it is to his advantage if they manure the ground heavily. The only thing he must remember is that the fallen grain will not last them long, and he must provide more food than would be necessary if the birds were running in more widely scattered flocks. Still, there is always a good deal of insect life on the stubbles, and young birds never do better than in such localities. The secret of success in farm poultry keeping is personal attention. Where a farmer makes the poultry his own particular care, as many do, knowing them to be, proportionately, the best paying stock on the farm, excellent results can be attained, but when the management of the fowls is relegated casually to anyone who may not be otherwise employed the same degree of satisfaction cannot be expected. The old theory that the fowls should be the particular care of the farmer's wife no longer holds good unless the lady is prepared to adopt modern principles. Few farmers' wives are willing or able to do the rough, heavy work in all weathers, of carrying food and water round to the colony houses and looking after the requirements of the stock. It is a strong man's work, and that man must be an enthusiast and a believer in the profitable nature of farm poultry keeping. Although many farmers are keeping a large stock of poultry upon the colony plan the majority are content to limit their operations, while adopting the same principle. Unfortunately, however, in many districts farm poultry keeping is rendered difficult and even impossible through the prevailing custom of preserving foxes, and the objection that many sporting landlords raise to anything likely to threaten the interests of foxhunters There can be no doubt that foxes are the chief scourge of the poultry-keeping farmer, and very few tenants are in a position to protect themselves by waging war upon the foxes. It is a grave question, that must become more prominent as the small holding movement grows, and upon its solution depends to a very large extent the future of poultry keeping on the farm.

The actual management of farm poultry differs only slightly from that of other stock. They require less food, but what they have should be good. In summer a handful of wheat in the morning is generally quite sufficient for the day, for on examination the birds will be found to have full crops at night. In winter a feed of warm soft stuff in the morning will do a great deal of good, and a small quantity of corn, preferably wheat and maize, will be necessary at night. It is quite true that hens which are kept in exposed positions in the field will not lay so many eggs during winter as the birds that are confined in sheltered runs, but they will lay more in milder weather, and taking the cost of production in consideration, the farm birds are the more profitable. By keeping the fowls securely shut up at night one can to some extent guard against loss through foxes; but to reap the full benefit of the unlimited range they should be out early in the morning, as soon as possible after daylight, the whole year round. In rearing chickens it is a good plan to utilise fresh ground every year, and if the coops or brooders are moved frequently the land will be enriched and the chickens will reap the benefit of running continually on clean ground. As soon as they are a couple of months old the young birds can be drafted off into the fields, where they will develop with surprising rapidity and at comparatively little cost. Farmer-poultry-keepers who have access to a good market will, in addition to keeping a large stock for laying, find it good policy to rear a number of birds for the table, for with their exceptional opportunities they can produce them at the lowest cost. Such breeds as Sussex, Faverolles and White Orpingtons are excellent for this purpose, and if the farmer can continue to hatch early he will reap a good return for spring chickens of these varieties. Some of the best laying and all-round breeds for the farm are Buff and White Orpingtons, White and Partridge Wyandottes, but the lighter breeds, such as Leghorns, should on no account be ignored, for under satisfactory conditions these small eaters and heavy layers are the most profitable egg producers of all. Turkeys, which benefit so greatly from being reared on fresh ground and having unlimited range, will always pay the farmer who manages them properly, and a limited number of young geese will bring in a good return at little cost so long as they do not interfere with the poultry, while the farmer also has an excellent chance of turning out early table ducklings if he goes about it the right way. Indeed, there is no branch of poultry keeping that the farmer cannot successfully and profitably carry on, provided he regards his feathered stock worthy of the attention they demand if they are to give the best results.

FARMING, POULTRY. ECONOMIC PRODUCTION. Although the term "Poultry Farming" is one in common use, it is so intimately connected with a certain phase of the subject as to require definition in order to avoid possible misconception. The term has been, and still is, used in a perfectly legitimate manner by those who would refer to other specific branches of agriculture in a similar way; yet it was, at one stage in the history of poultry keeping, practically monopolized by those who, in absolute ignorance of the management of arable and grass land, advocated impossible schemes of 'farming' fowls, to the exclusion of husbandry. Upon this account the term has acquired some degree of ill-odour, the 'boom' being past and the bubble satisfactorily burst. Those, therefore, who retain a useful form of words are put to the trouble of explaining their meaning, and it would save much time and patience if "Economic Production" could be substituted for the more ambiguous term. The whole superstructure of the popular fallacy was erected upon the erroneous assumption that poultry farming could be profitably conducted apart from other simultaneous farming or stock keeping, and could of itself be so carried on as to provide, not only a means of livelihood, but a short cut to fortune. It is the result of practical experience that any extensive production of poultry can only be economically conducted, when adequately supported by general farming, one of its branches such as dairying, or to the accompaniment of fruit or flower growing, or some other coincident use of a sufficiency of land. It may be a chief aim, or even the backbone of the business (as it is in the chicken-fattening centres), but that it cannot stand alone, pay all outgoings and show a sufficient margin of profit for the support of the 'farmer,' has been abundantly proved, time after time; and those who still cling to the theory that such a course of operations is possible, are either ignorant, irresponsible, or not entirely disinterested. The unit dealt with is so small that the return is insufficient without a considerable increase of acreage for the due accommodation of the necessary multiplication; and the profit upon fowls is in some measure in inverse ratio to their multiplication. Moreover, a sufficient acreage for the purpose at once upsets the theory, by necessitating all that is implied in husbandry.

Economic Production is, however, a sufficiently definite term for the present purpose, and is, moreover, elastic enough to include large and small producers, and it is a term without a stigma, such as attaches to poultry farming. Having once rid himself of all exaggerated ideas concerning poultry, the man who would undertake any form of economic production, whether upon one acre or one hundred, must go to work in accordance with certain broad principles, and the first consideration is a personal one.

—— **PERSONAL QUALIFICATIONS.** There are certain essential qualifications which make for success in poultry production as there are in most other occupations, and the impression that any and everyone can manage fowls profitably is as absurd as to think that all are competent to make a fortune on the Stock Exchange, or a living at brickmaking. Indeed, the first supposition is the more foolish, inasmuch as very few men are really competent breeders of animals of any class; and although fowls are small stock their correct breeding and rearing entails knowledge as particular as that involved in breeding beasts. The science of breeding is large and complex, and the poultry producer must add to that a knowledge of many other things, including a full and detailed acquaintance with the constituents of feeding stuffs, and the desirable ratio in which to feed them in order to secure given results. In addition to a practical and theoretical knowledge of the work, and an active brain to direct his operations, with a business capacity to find and make the most of his markets, the producer must be a man of sound constitution and possessed of an infinite capacity for continuous and hard work. A man should possess all these qualifications and as many more as he can acquire of the same sort, before he attempts production at all upon any sort of serious commercial basis; and his capital must be proportionate to the extent of his undertaking. Similar qualifications are essential to success in any commercial enterprise, and the general mistake has been to suppose that profitable poultry production is a glorious exception.

—— **DESIRABLE HOLDINGS.** As a general proposition it may be said that really desirable holdings for poultry production are seldom those that are advertised as such, and as the acquisition of a holding at all involves husbandry in other branches its suitability must be considered in relation to the several departments of production. The best time to inspect the land and buildings is during or immediately after a spell of wet weather, the general conditions during summer may very well be imagined, but the worst state must be seen to be fullv realized. From the point of view of the special production under consideration, it is essential to avoid fowl-sick land, and the mere fact that it has just recently carried a large feathered stock, is a bad recommendation. Rent must be considered in the general relation, and local facilities for transit and marketing will influence this item; but if the other branches of the farming will bear a good rent for rich land, it may be remembered that the fowls will be porportionately better than on the poor soil. The character of the soil must be suitable for the intended cultivation, and although poultry will thrive better upon some soils than others, there are very few situations to which some descriptions of fowls are not adaptable; and economic poultry production must adjust itself to the other profitable use of the land, or it ceases to fulfil its requirements.

—— **LOCALITY.** Although organization is increasing facilities and opening up new and distant districts, by linking scattered producers and their markets, all such progress is slow; and at the best there will remain localities which are more favourably situated than others for the various branches of production, as regards cost and marketable values. In cases where there is no choice, and the production must be undertaken in a given neighbourhood or left alone, the only obvious course is to produce in accordance with the local requirements and the custom of those who are already at work in the district; but where some freedom exists, the locality chosen must depend upon the branch or branches of production under contemplation. To particularize, it may be broadly suggested that the producer of table chickens, or their fattener, should settle in the south-eastern districts in which this branch is a local industry; for duckling production, Buckinghamshire and Bedfordshire offer some facilities; for turkey breeding and rearing, Norfolk and its neighbourhood afford advantages; gosling production is limited and more general; and the egg producer should choose the radius of an egg collecting depot, or the vicinity of a railway station between London and a populous coast town, and the latter conditions would be favourable to a more general or all-round production. The advantages of localization in connection with such an industry will be apparent upon consideration. The reputation of a local product helps in some measure to maintain, if not to enhance values; and the existence in a neighbourhood of a considerable number of persons skilled in any particular work, is a factor which tends to fixity—no equal advantages being obtainable by migration. The traffic in produce becomes organized, with a consequent probable reduction of rates and duration of transit; and there is some possible growth of supplemental trades, or their modification to the accommodation of the producer, as in milling and appliance making. All such considerations tend to reduce cost of production, and increase the marketable value, matters of consequence in a business in which the margin of profit is never very wide. Such facts serve to emphasize the difference existing between isolated producers and those who benefit from grouping or localization. There are, of course, some men who are capable of achieving success where others would find failure, but they are very few; and as it is so easy to find the wrong district for a special production, very exact preliminary enquiries are essential.

If the desire is to conduct business upon more general lines the locality is of less importance, provided the holding is near a station and not too distant from a populous town; and although a general production cannot be so profitable in any one line, it is obvious that the risks are more distributed. Unless, therefore, there is any particular personal aptitude, or encouraging circumstance, it is often better to generalize than to specialize.

——**STOCK AND PLANT.** It is much better to commence in a modest way than to lay out a large amount in the initial purchase of stock and plant, and as the business grows it will soon be seen in which direction it is desirable to extend and where modifications are necessary. Moderation is never more essential than in the beginnings of poultry production. As regards the acquisition of plant, and the appliances requisite for the several branches of production, it is unnecessary here to do more than generalize, and to impress the necessity for purchasing with a view to the future; *viz.:* the probable life of each appliance should be considered, and bad material or workmanship rigorously rejected. Ordinary fowl-houses may be purchased more cheaply than they can in most circumstances be made, but selection must be made of substantial structures which will not be readily overturned by cattle, and in the making of which only well-seasoned wood has been used. In the matter of incubators there is a choice to be made between non-moisture and tank machines (*see*

"Incubators"), but in regard to anticipated results the uninitiated must discount some of the extravagant claims made for these machines; taking the year through the novice will probably not secure a higher hatching percentage than an average of about 60 per cent.; although some hatches may perhaps in favourable circumstances approximate to 100 per cent, an estimate of 50 per cent. would be safer for preliminary calculation.

The most important lesson to learn, relative to the purchase of stock, is that a fowl of a breed or description which is theoretically the best for a given purpose, is not on that account necessarily the most suitable from a practical standpoint, the suitability depends rather upon the individual and its strain, than the breed or description (*see* "Breeding"). If the intention is to produce table poultry, the best course is to endeavour to procure stock birds from men already successfully engaged in the same branch of production; and in the purchase of fowls for egg production, it does not do to believe all that is stated about some of the so-called "laying strains," without some proof.

—— **FEEDING SYSTEMS.** From the haphazard methods of our forefathers, we have developed an ultra-scientific school of theorists, to understand whose feeding systems it is almost necessary to qualify as an analytical chemist and build a laboratory in the farm buildings. Although it is not here suggested that the producer should be unscientific, it is necessary to point out that a practical man has not much to gain by the constant use of weights and scales, and the frequent working of mathematical problems. What is really essential is that the feeder should possess a good working knowledge of the composition and use of the various feeding stuffs, and broadly apply such knowledge in the practice of feeding; to expect or attempt more is to defeat the practical aim of production, and it is sufficient to know what foods and their proportions are best suited for laying, rearing, fattening and so forth. (*See* "Feeding.")

—— **SEASONS AND MARKETS.** Finally, the reader may be referred to the articles dealing with 'Marketing' and 'Poultry values,' it being essential to profitable production to possess a thorough business knowledge, not only of the methods of marketing, but more particularly of the seasons most remunerative for various kinds of produce, in order to strike the various seasonable markets on the rise. There is a season for everything, and profit largely depends upon the proportion of the production that is sold at the best seasonable prices. In so far as the English producer fails to meet the successive special demands, to that extent he plays into the hands of his foreign competitors with whose methods some acquaintance is essential. All the details connected with the breeding, rearing, fattening and so forth, of the various descriptions of stock, and full information relative to egg production, and the management of stock in general, will be found under the several headings.

FAT (*see* "Feeding stuffs.")

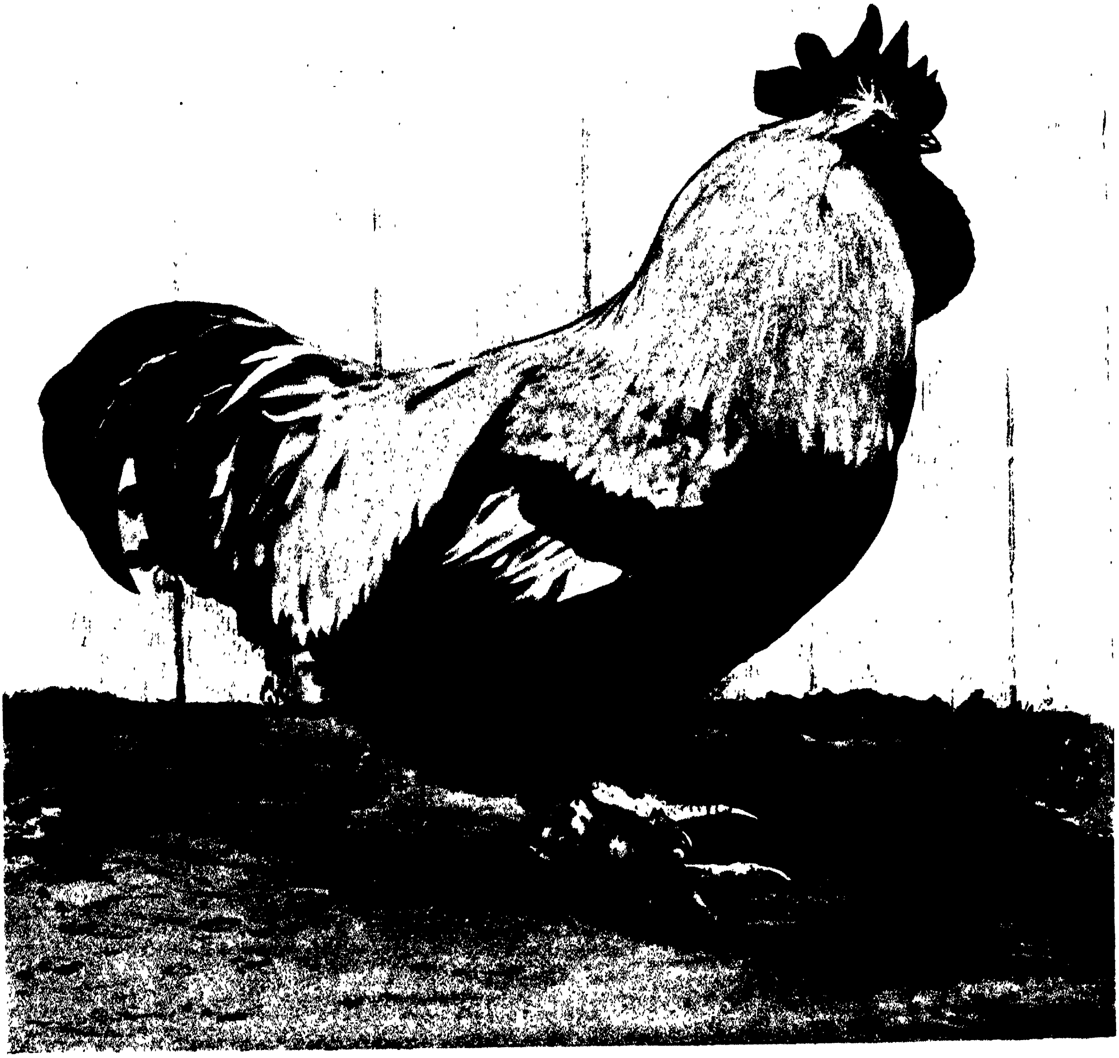
FATTENING. Fattening may be either the conclusion of the whole process of production for market, or it may be involved in the scheme of feeding from the time of hatching to that of killing; but in one aspect or another it is an integral part of the preparation of poultry for table purposes, and its neglect is economically disadvantageous, alike to producer and consumer. If it were possible to estimate the annual loss entailed by the premature killing of lean fowls the sum total would undoubtedly be startling, and that this statement involves no exaggeration is manifest to any observer of the poultry in the markets and retail shops—a display which supplies no adequate gauge of the national waste, in which must be included the numberless birds reared and killed for home consumption. A great deal of the general supineness in regard to this matter is, no doubt, due to an ignorant misconception of the fattening process, and a belief in the supposed difficulties, as well as a disbelief in the material benefits. If we consider fattening as an extensive branch of commercial production it is, of course, subject to certain limitations, tending to restrict success to favoured districts; but the individual fattening of fowls on a comparatively small scale is sufficiently remunerative to make the undertaking worth while, either for occasional consignment to a market or for private use. This will be sufficiently indicated by the results of a typical experiment, in which representative chickens killed off the run averaged 2 lbs. 10 oz. apiece; others of the same batch averaged 4 lbs. after fourteen days' trough feeding; and the remainder, which were trough fed for a month, averaged 5 lbs. Of these weights it was found that for all practical purposes one half of the net weight (1 lb. 10 oz., 3 lbs. and 4 lbs. respectively) was available in each case, which is sufficient to show the approximate average results, although it is probable that the best economic results are those obtained from a period of three weeks' fattening—two trough feeding and one machine cramming. The above is, of course, in reference to the fattening of chickens, but the same argument holds good in differing degrees as regards the fattening of ducks, geese and turkeys; relative to ducklings the method is different in that the whole system of feeding, from the shell to the date of killing (which is only some eight or nine weeks later), is of a fattening character. With all adult birds, of any description, the fattening process consists in a special period of suitable feeding immediately before killing, it being, of course, understood that the birds are of a suitable breed and are in good condition when penned for the purpose. Chickens used for fattening should be of the approximate age of three months, and, as in the case of older birds (of various descriptions), are fattened during a short final period—their previous feeding having been with a view to the production of a suitable size and frame, but not fatness. Although the best results can only be obtained by skill and experience, some measure of success is obtainable by the intelligent novice; but machine cramming should never be attempted without some previous practical instruction, and until this can be secured the beginner should learn all he can of the practice of trough feeding and confine his energies to that branch of the process.

——**CHICKENS.** Breeds vary considerably as regards their suitability, or otherwise, for submission to the unnatural process of coop fattening, and it is essential to the success of such an undertaking that the birds employed shall not only be in a good state of health and in fair condition, but that they shall also be quiet in disposition and of a breed that is known to respond to the treatment. As an example of the differences in this respect it is only necessary to contrast such a breed as the Indian Game with the Sussex or the Faverolles, and to note that although the former carries a good quantity of breast meat when running it is restless and impatient of restraint, whilst either of the others will quietly submit and put on flesh in close confinement. There are several breeds and crosses that are more or less suitable, but undoubtedly the best material exists in the Sussex—after which cross-breeds, including Brahma or Plymouth Rock blood, are generally suitable. The non-sitting breeds should not be used, even in crosses. The Faverolles may be used in a variety of crosses and usually serves the purpose well, and for the production of very large specimens the Indian Game-Dorking is one of the best.

Although an approximation to three months has been mentioned as the best age at which to commence the fattening of chickens, no rule is possible, because size is the main factor, and the attainment of this depends upon the feeding and general management during rearing; but healthy birds of the right description, run upon a free grass range, should be ready at or about the time indicated—and, as in all the processes of production, it is of considerable economic importance to determine the crucial period accurately. The best method of confining the chickens during the fattening period is to place them in long coops similar to those used in the Sussex fattening districts. These coops are usually made seven feet long, which size will accommodate eighteen birds, six in each of the three compartments—the height and depth being each about twenty inches, except in the case of outdoor coops, which are rather higher in front to allow for a fall in the roof to carry off the rain. The construction of these appliances is light but strong, and they are very like wooden cages, being made of narrow bars or rods throughout; those used in the flooring narrowing from about an inch at the top to half an inch at the bottom—the depth being an inch—by which means the manure drops through to the ground without hindrance, and is easily removed without fouling the cages. These long cages or coops are raised about three feet from the ground, supported on a rough wooden staging made of stakes and cross bars under each end, the earth beneath being sanded or covered with fine mould (and some lime) which, with the droppings, is removed daily and used in dressing the land. They may be used under cover of a shed, in which case the tops are also made of bars; or out-of-doors, when a wooden roof is fixed; or indoor coops may be used and covered with a length of corrugated galvanized iron sheeting, falling to one end. If used in a shed, the building must be very well ventilated; and if used outside they should be sheltered by a hedge at the back and a faggot, or other suitable wind screen, in front. As a rule, shed-fattening is preferable in winter, and the open-air method in hot weather. The sheds and coops must be kept scrupulously clean and should be frequently lime-washed—the coops every three weeks, or as often as the occupants are changed; and where a large number of coops are in frequent use it is better, and labour saving, to dip them in lime wash where there is a suitable receptacle for the mixture. The birds themselves should be treated with flowers of sulphur immediately before cooping, in order to relieve them of the irritating presence of insect pests, which will otherwise keep them in a restless state, and to that extent hinder the due progress of the fattening process; the method of applying the sulphur is to rub a small quantity beneath one or both wings, and around the vent, and if it is well rubbed in the lice will leave the fowl. Relative to this necessity for undisturbed quiet, the position of the fattening quarters cannot be too far removed from any possible cause of disturbance, and where necessary screens should be erected to limit the visual range of the birds. Under no circumstances should dogs be allowed in the vicinity of the fattening coops. It is also important, in the same connection, to be strictly punctual in the hours of feeding; the fowls soon learn when to expect their food, and if they are kept waiting their fretfulness will probably cause them to lose condition more rapidly than the feeding improves it.

During the first day of cooping no food should be given the birds, this preliminary fasting inducing a good appetite and a better subsequent contentment. The first period of coop feeding consists in the giving of the specially prepared food in the long wooden troughs hung in front of the fattening coops. The troughs are V shaped, made of two lengths of boarding fastened together at a suitable angle and

PLATE No. 37



Faverolles Cock.

(*Bred and exhibited by Mr. F. Chaloner-Smith, Carrickmines, co. Dublin*)

Winner of 48 Challenge Cups, Specials and 1st Prizes.

having the ends blocked, and they are either suspended in front of the bars by means of loops of thick string or rested on projecting supports; but they must be easily removable to facilitate cleansing, and should be frequently and thoroughly scalded. The birds should be fed in the trough twice daily, the trough being removed when sufficient food has been consumed, the food consisting of a mixture of Sussex ground oats, milk and fat. The oats should be ground in the Sussex manner (in a stone mill) otherwise the meal will not be sufficiently fine, and the unground pieces of husk, so common in other meals, are liable to cause digestive derangements, and in any event some of the desirable qualities of the food are lost—the great point of the Sussex method of milling being that the whole of the constituents of the grain and husk are rendered available. The milk (usually skimmed) is generally allowed to become sour before use, but it is sometimes desirable to dilute it with water—for digestive reasons; and when the dairy supply runs short of the requirements, damaged or "blown" condensed milk is frequently employed, and is purchasable at about 4s. per case of six dozen. If soured whole milk is used, less fat is required. Clarified mutton fat (or Australian tallow) is largely used, melted and mixed with the meal—in varying proportions, up to a maximum of about half an ounce per bird daily; but as the mixing is generally done by a "rule of thumb" method, based upon experience, it is difficult to give exact proportions.

In mixing the food at the commencement of trough feeding the consistency must not be too thick, or digestion will be impaired. It should at first be easily pourable, but made a little thicker towards the end of the first week; and the quantity, which must be strictly regulated at the beginning, should be gradually increased until towards the end of the second week, then as much must be allowed as the birds will eat. Over-feeding at the beginning of the period is a hindrance rather than a gain. The safe length of ordinary trough feeding is approximately a fortnight, but varies

Old-fashioned Method of Cramming Fowls by Pellets in Sussex.

with the individuality of the birds and the skilful management of the feeder; and although for some purposes a longer period may be necessary, it should only be attempted by the experienced. It is also a matter of experience to determine the exact time at which a fowl has reached the highest attainable point by self-feeding, and when the maximum is reached, any further trough feeding is only harmful, and the bird must be at once killed or subjected to a course of cramming. Cramming may be performed either by the administration of pellets of food by hand, by the use of a funnel and a liquid food, or by a machine; and as the latter method has now-a-days practically replaced the other and more laborious methods, no useful purpose would be served by their description. There are some half dozen or so patterns of cramming machines manufactured in this country, but the best known and most practical are operated according to the pump principle, the semi-liquid food being poured into a hopper from which it is admitted by a valve arrangement to a lower food chamber, from the bottom of which a plunger (worked by a treadle) forces up the food and, closing the valve, ejects the food through a flexible tube into the gullet of the fowl, and so into the crop. The bird is held by the operator, facing the machine, who by the position of his hand upon the bird's crop is able to regulate the movement of his foot on the treadle, and stop the action of the pump when the crop is filled; this is an operation demanding considerable experience, owing to the unequal capacity of the crop in different fowls, and the ever-present risk of bursting that organ. This treatment, feeding twice a day, may usually be continued for a week or ten days; but here again the individuality of the fowl, and the skill of the operator, are the chief dominating factors. When the point of the highest attainable perfection is reached, the cramming process must cease and the bird be killed, before it commences to lose what has been gained. The food used in cramming should include the same ingredients as in trough feeding, but must be a thinner mixture—of about the consistency of thick cream. When cramming follows trough feeding the fat is often withheld until that second period of feeding commences, and during the preliminary feeding some fatteners use in addition to ground oats an admixture of buckwheat meal, barley meal or maize meal—but the mixture of ground oats, milk and fat is generally recognised as being the best.

Sussex Method of Cramming.

——**TURKEYS.** Turkeys which carry a quantity of flesh are usually those possessed of small bones, and are, therefore, better suited for fattening than for reservation for stock purposes; and after being allowed the full run of a good range, and sufficiently fed to maintain a good condition, the selected birds should be confined for fattening sometime during November. The turkeys that respond most readily to the fattening treatment, and give the most satisfactory results, are those that have been maintained in a good condition throughout the rearing period; and it is found that any earlier loss of condition, or set back in the progress of growth and development, is almost impossible of recovery under any subsequent treatment. About a month then before the date fixed for killing, the birds must be confined to a large open-fronted shed, dry and airy, but free from draughts. A very good fattening food consists of a mixture of Sussex ground oats and milk, to which some fat may beneficially be added on alternate days; and a proportion of barley meal and maize meal may be used—in equal proportions—together with boiled potatoes and swedes. The mixture should be sufficiently soft without being sticky, and fed (with plenty of grit) in troughs stood on the floor at a suitable height for the birds to reach without putting their feet in. Cramming is a matter of individual preference, but for all ordinary purposes a sufficiently good condition is attainable without.

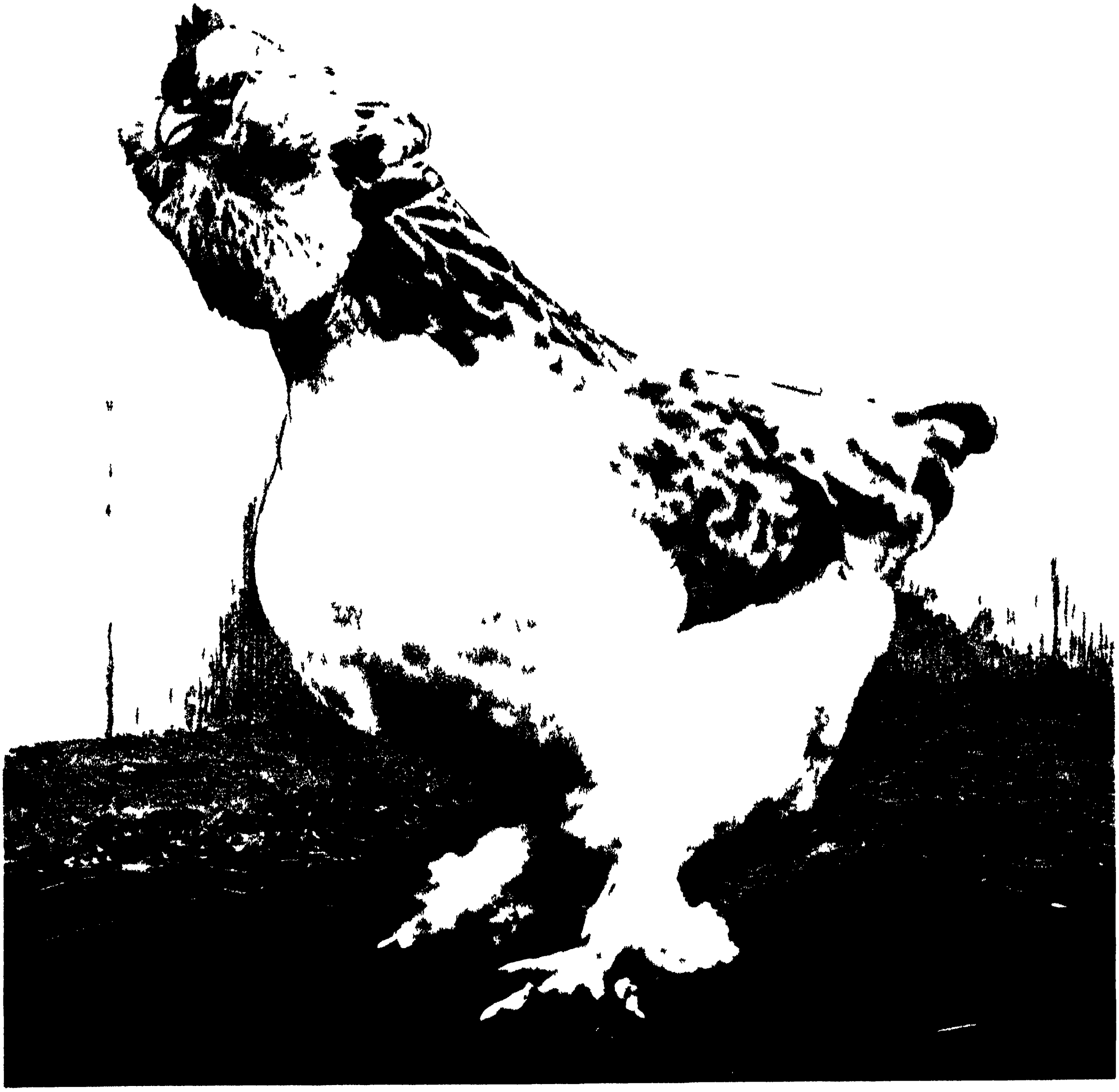
——**GEESE.** In the production of "green" geese there is no special fattening, the whole process of rearing being directed towards the attainment of a suitable maturity within about three months; but for autumn or winter killing, some finishing period of special feeding must follow the previous freedom of the grass range, and the grazing must be more particularly supplemented than is necessary for earlier marketing. For autumn killing, goslings in good running condition, that have been perhaps folded on roots, will only need to have their range rather more closely restricted for a few weeks, being fed liberally on meal and brewers' grains. For winter fattening it is preferable to confine the birds to open-fronted sheds for the final month or five weeks, and to feed two full meals daily. The food mixture for this purpose should consist of barley meal, sharps, with a proportion of brewers' grains—this for morning feeding; and in the afternoon some feeders prefer to give corn, the grain being fed in the water troughs with plenty of sharp grit; and a good supply of green food should be available throughout the period.

——**DUCKS.** The feeding of ducklings for early maturity having been already dealt with, it only remains to refer to the special feeding involved in the production of fat ducks for autumn or winter use—for which purpose the Rouen is a suitable type to use. An open-fronted shed may be used, well bedded with clean straw; or in suitable weather they may be penned in the open air, but in no case must they be allowed access to too large a space. In temperate atmospheric conditions the outside pen is preferable, but the progress of ducks during the period of fattening is materially influenced by the weather, and discretion must be exercised in this particular. Different mixtures of meals are used for the fattening of ducks, but some of the finest specimens have been produced by the mixture of Sussex ground oats, milk and fat; but the feeding is cheapened by the use of barley meal and sharps, mixed with an equal proportion of ground oats. Buckwheat meal may be used instead of barley meal, or one part of maize meal with two each of buckwheat meal and ground oats is a useful food; but maize meal should not be used too freely on account of its influence upon the quality. Any meal mixture should, if possible, be mixed with milk during the final stage of fattening, its use being beneficial in fattening, and tending to improve quality and appearance. Two full meals a day are usually sufficient, the mixture being of a semi-liquid consistency, fed in wooden troughs. Cramming is sometimes resorted to in order to secure exceptional size, but is generally unnecessary for all ordinary purposes of production.

FAVEROLLES. This variety has of late years been supplanting all the other and older varieties forming the French group, and it is now so popular that at the present time the number kept in the United Kingdom must far exceed all the other French breeds added together. There is generally supposed to be some uncertainty as to the origin, or rather as to the varieties used in the making up of the Faverolles, but to those who bred them before they became so well established, there can be no mystery in the matter, for until a few years ago it was not an uncommon experience, when Faverolles quite unrelated to one another were mated, to find them throwing a certain percentage of fair-class Light Brahmas and Silver Grey Dorkings. The beard and muffling conclusively prove the Houdan to have also been connected with the ancestry of the Faverolles. It is important to lay special stress on this question of parentage as some breeders appear inclined to ignore the Dorking blood in the Faverolles' composition, notwithstanding that it is a most valuable ingredient. Such a bird is not only inferior to the true Faverolles, from a utility point of view, but is also not at all in accordance with the description given in the standard of the breed. The words of the latter referring to the cock, so far as type is concerned, are: Neck, short and thick, especially near the body, into which it should be well let in; back, flat, square, very broad across the shoulders and saddle, and of fair length; breast, broad, keel bone very deep and coming well forward in front, but not too rounded (a hollow breast very objectionable); sides, deep; wings, prominent in front, but small and carried closely tucked to body; body, thick, deep and cloddy; tail feathers and sickles stout, medium length (a flowing tail carried low or straight objectionable); thighs, short, wide apart, plenty of body between them; shanks, medium length and stout, straight, slightly feathered down to outer toe; knees, straight, carried well apart (narrowness or tendency to be in-kneed very objectionable); toes, five, the fifth toe totally separate from the fourth. With the exception that her neck should be carried straighter, that her back and keel bone should be longer, the standard for the hen is similar. Anyone turning to the illustrations of Brahmas, Houdans and Dorkings will at once see that the type of the Faverolles described in the standard favours the Dorking parentage much more than it does that of the other two varieties concerned, and too much importance cannot be given to this point.

Those taking up the breeding of Faverolles would be well-advised to place the question of size and type first, and to get these points firmly fixed; then when their stock are throwing nothing but specimens correct in this respect, they can devote their attention solely to the question of colour and minor points. Referring to colour the standard says, the cock: Beak, horn or white; face, lobes and wattles, red; beard and muffling, full, wide, short and solid black; hackles, straw; back and shoulders, a mixture of black, reddish-brown and straw; breast, black; wings, the wing bow straw, the wing bar black and the secondaries showing white on the outside; thighs and under fluff, as black as possible; legs and feet, white. This is sufficiently explicit and it need only be added that a cockerel with plenty of red feathers on his back is an acquisition, for during his second moult most of these will turn white, and if he has only barely the correct amount as a cockerel he will have either an insufficiency of them or none at all as a cock. It is also doubtful whether "as black as possible" goes far enough in reference to thighs and under fluff. These should be a bright glossy black without the semblance of a white,

PLATE No. 38



Faverolles Hen.

(*Bred and exhibited by Mr I Chaloner Smith Carrickmines co Dublin*).

A Winner of many Prizes

grey or brown feather; likewise the neck, just below the beard—many otherwise good birds being ticked with grey, or even white, at this part. Then as to neck hackles: These should be absolutely clear straw colour all over, and not only not striped at the ends, but not even mossy. Breeders will find it easy to breed birds with correct brown backs and clear hackles; also with the former, in conjunction with sound black under-colour. But the great difficulty is to find a bird perfect in all three respects, for somehow a cockerel quite sound in under-colour is generally faulty in hackles, and *vice versa*. The old cock, a plate of which is given, is sound in both these points, but on the other hand he never had enough red on his back at any part of his career.

Breeders will find full scope for the exercise of their brains and perseverance in the production of a perfectly-coloured Faverolles cockerel. Referring to the colour in hens the standard says: Beard and muffling, creamy white; head and neck hackles, wheaten-brown, striped with same colour of darker shade; back and shoulders, wheaten-brown; wings, similar to back, but the colours are softer and lighter; primaries and secondaries, wheaten-brown; breast, thighs and fluff, cream; tail, wheaten-brown.

This description would not appear to be sufficiently explicit. We can all understand the meaning of cream and creamy white, but the word "wheaten" is somewhat vague. It has given rise to much uncertainty as to the exact colour required, for wheat is to be had of many shades, and wheaten is not really a recognised colour. It is questionable whether many of the hens now winning are not too pale in colour, as the backs of some of these approach the colour of hay, and the correct colour is warmer than this. The fact of the words "wheaten" and "brown" being associated denotes that the pale wheaten colour, which is in no respect brown, cannot be that required by the standard. Whatever the shade desired, fanciers will find it incomparably easier to produce high-class exhibition pullets than cockerels, but on the other hand this tends to make competition in the classes devoted to the former much keener than in those devoted to the latter; it is only a really first-class hen that stands a chance of winning under a judge that understands his business.

A Faverolles' comb, according to standard, should be: Upright, single, medium size, from four to six neat serrations, free from coarseness or any side work; wattles, small, fine in texture. This is important, for some breeders seem lately to have been attempting to develop a bird totally devoid of wattles, and that this was never intended by the standard is evidenced by the fact that it describes what the wattles should be. Apart from this it alludes to the beard and muffling as separate entities, showing that these should be separated by wattles. If the latter are done away with, obviously the whole arrangement of beard and muffling is merged into one, like the mane of a lion. Large wattles are, however, objectionable, apart from their constituting a disfigurement; they make the beard and muffling look scanty.

Some judges seem to attach great importance to the precise amount of feather on a Faverolles' legs, but it is difficult to see why they should, and, so long as extremes in both directions are avoided, considerable latitude should be allowed in this respect. The standard makes one curious omission in that it does not mention hocks. All judges, however, seem to be unanimous in discountenancing vulture hocks, looking upon these as a great blemish.

The vast majority of good Faverolles hatch out clear in colour, varying from white to a dirty canary yellow. Some of the best cockerels ever bred, however, have hatched out with their back striped like a Dorking, but such chicks never develop into exhibition pullets. Pullets in their first feathers appear very much what they will in their next, but the probable merits of cockerels are harder to judge in their chicken feathers; they are never clear in hackle and never quite black in under-colour. The former clear very considerably during their first moult, while the under-colour gets blacker, but they also lose much of the brown which as chicks they had on their backs. Male chickens, however, with a lot of white in breast, or very dark neck hackles, or likewise with little or no brown on the back, can never be any good for show purposes. A brown breast, however, often moults out black. All chicks with side spikes to their combs, with an insufficiency or superabundance of toes, roach-backed, crooked-beaked, or possessing such other fatal blemishes can, of course, be at once discarded, the variety being at the present time much too nearly perfected to permit of any such passing muster on the show bench.

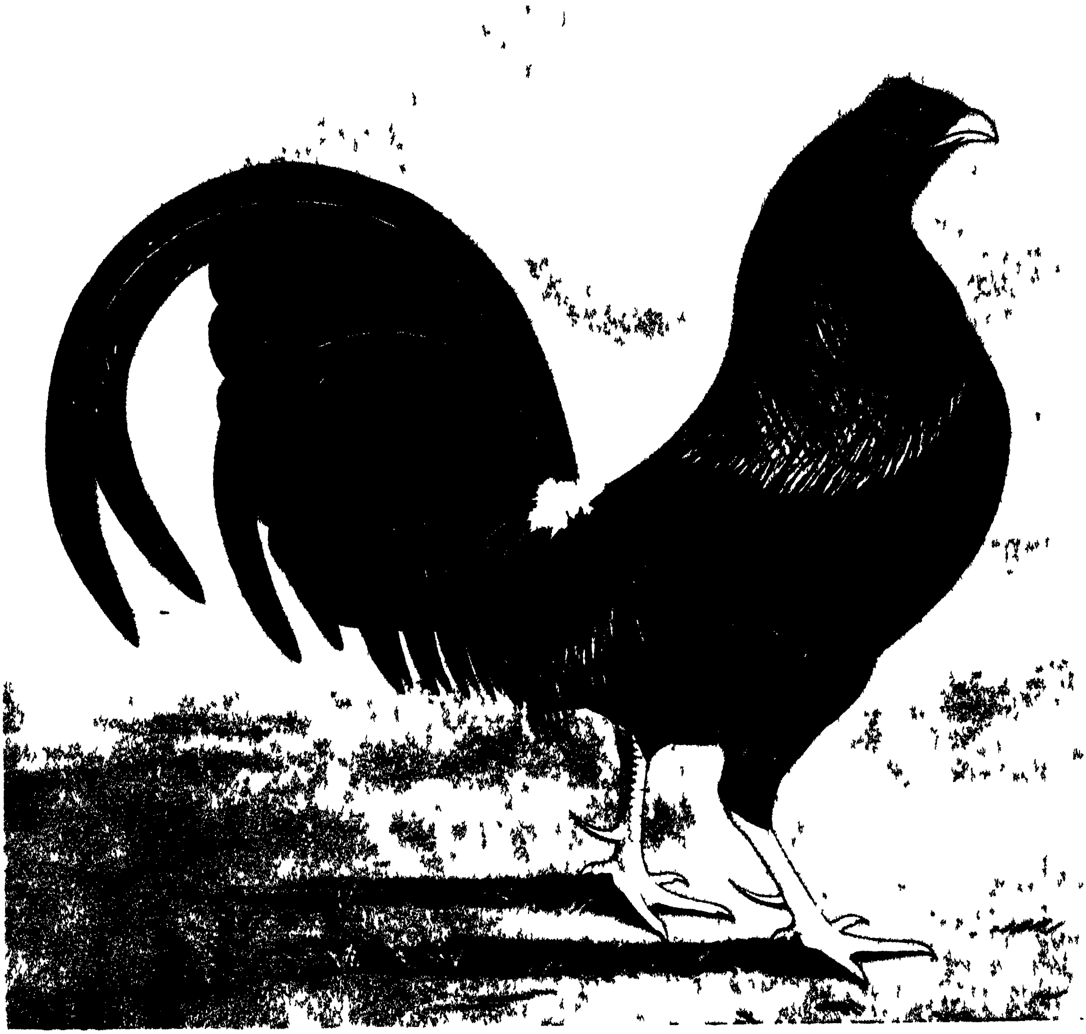
One of the most hopeful things for the continued popularity of the Faverolles is that, so far as type is concerned, the best exhibition specimen also constitutes the best utility bird. For both purposes we require them solid. Likewise the hens of this type also lay the largest eggs, as a rule. As to quantity of the latter, the Faverolles hen is a capital layer all the year round. The Faverolles has never, however, been bred to become a mere laying machine at the cost of its many other good qualities. Although the Faverolles continues to be persistently looked upon as a sitting breed the modern type very seldom sits. On the rare occasions, however, that the Faverolles hen does make up her mind to sit she makes an excellent mother.

Faverolles are wonderfully quick growers, not only maturing much earlier than any other of the heavy breeds, but as quickly as most of the light breeds. The chickens are most hardy and contented little creatures and give little or no trouble in the rearing. The adults are also exceedingly hardy and seem to make themselves at home under all and every condition. As exhibition birds they bear the inestimable advantage of requiring no shading whatsoever from the sun; the latter improves the straw colour of the cocks, while it in no way injures the colour of the hens.

Some people seem to be under the impression that to breed high-class exhibition Faverolles of both sexes double-mating is necessary. Such is not the case at all, and were this belief to remain uncontradicted it would tend to do the breed serious harm, especially in the way of frightening small breeders, who have room for only one pen, and require a good all-round variety that will produce both exhibition specimens and the best of utility birds, either as regards laying or table qualities. It is advisable, however, that such a pen, in addition to being headed by the best cockerel available, should contain, not only exhibition hens or pullets, but also some that are known to be mothers, sisters or daughters of successful cocks. Such a pen should produce exhibition birds of both sexes. To some it may seem that the Faverolles' appearance savours somewhat of a plebeian type. If so, it must be remembered that the latter form the backbone of the poultry world, that such birds are intended to combine both exhibition and utility qualities and that they have no place in the ranks of the purely ornamental varieties that form the aristocracy of the fancy. (*See Plates Nos.* 37 *and* 38.)

FEATHERS, CLEANING AND PRESERVING. When feathers are prepared for the market it is necessary to keep those from fowls, ducks, geese, turkeys and pigeon separate. Place all quills from wings and tails apart, and in the case of cocks also the long glossy feathers from neck, chest and back. The small feathers may then be preserved

PLATE No. 39



Old English Black-Red Game Cock.

(*Bred and exhibited by Mr. Henry Gustavson, Woodville, Burton-on-Trent.*)

Winner at (International) 1907 and 1908, Birmingham, Leeds, O.E. Game Club 1907 and 1908, Belfast 1909; 1st and Gold Medal Paris (International) 1909.

by the dry or the wet process. For the former purpose use a number of large paper bags by basting old newspapers together with thread. Sprinkle the feathers slightly with some dilute non-corrosive disinfectant, such as Cyllin, and stuff them loosely into the bags. These bags should then be placed in an oven, hot enough to scorch a piece of paper in five or six minutes. The bags may be left in until they begin to brown. The steam generated from the disinfectant will enable a much higher temperature to be withstood than if no moisture was used, and assists in the destruction of parasites and spores. Remove the feathers from the bags and beat them lightly to get rid of dust, etc. Place in fresh bags of waxed paper and keep well fastened down until required for use.

The wet process is suitable both for small feathers and for quills. Dissolve in water at a temperature of 100 degrees F. sufficient mild white soap to form a milky emulsion; stir the feathers in this and allow them to steep for an hour; then stir again and collect on a sieve to drain thoroughly. Treat in a similar way in a second warm bath, but use Castile soap instead of the white curd soap. Finally rinse in two tepid baths, made slightly alkaline by the addition of a little ammonia. Lastly, rinse in clear cold water. If the feathers are very greasy the first alkaline bath should be rather strong, using either soda or ammonia, remembering, however, that if too strong, the natural lustre of the feathers will be destroyed. The feathers may be dried by putting them in paper bags and placing these in a mildly heated oven, or, if large quantities have been treated, they should be finished in regular drying drums. These consist of jacketed cylinders, slung on standards, having perforated ends and a wide door. Steam is admitted between the outer and inner casing of the drum, which is then rapidly revolved. If this latter system is adopted it is unnecessary to beat the feathers, as the shaking will effectually remove all dust and render the feathers soft and fluffy. Preserve in well-waxed paper bags. Where a great amount of feathers is dealt with it is well to keep them separated, so as to classify, not only according to kind, but colour, as better prices can be obtained when careful grading is followed.

FEATHERS. GROWTH. Feathers are the integumentary or external protective covering of fowls, being in effect modifications of the epidermis—or cells enlarged outwards. Although differing in many particulars there appears to be a similarity of purpose as regards the tegumentary appendages of mammals, birds, and even plants—that of protection from atmospheric changes. In the case of the fowl a relatively high degree of warmth is essential owing to its considerable muscular activity, and the maximum of warmth with the minimum of weight is afforded by a protective covering of feathers. Moreover, they effectually protect against all ordinary conditions of moisture, this property being due partly to the secretion and distribution of oil, and partly to the entanglement of air beneath their surface by the formation of the webbing. During their growth feathers have a living vascular existence, drawing their nourishment from nutrient vessels. Until they attain to the perfection of their growth, their progress is rapid; and during that period they continue to draw upon vital forces—a fact to be remembered by the breeder during the initial growth and subsequent renewal of his fowl's protective covering. The manner of growth is very similar to that of hair, development commencing within depressions or bay-like cavities in the skin, and continuing by the addition and elongation of cells from a bulb, and their transition into a fibrous stem. Upon the completion of development and growth the fully-formed and perfect feathers commence to decay or die; the wasting process is characterised by a dryness of the feathers, and a gradual death from the apex to the base. The final stage is that known as moulting, and is followed by a new growth and repetition of the previous process.

——**COMPOSITION.** Feathers of practically every form, size and description are composed of quill, shaft and web. The quill is that short and broad portion which is attached to the skin. In the form of a horny tube, with an opening at either end, it contains numerous coniform vessels tightly packed and attached to one another. The shaft, although differing in particulars of form and structure, is a continuation of the quill. It is a spongy structure within a thin horny covering, the shape of which in comparison with that of the quill being modified into flat sides, with a convex back and a grooved under side. The web consists of a series of small fibres springing from both sides of the shaft, these fibres or barbs being fastened and having their points inclining in the direction of that of the shaft. The retention of their relative positions is a curious and interesting characteristic of the barbs, and such a variation as that observable in the Silkie fowl is quite exceptional. Their interlacing power is in the larger feathers partly due to a corresponding concave and convex formation on adjoining barbs, but is in general chiefly owing to microscopic curved filaments existing upon the sides of the barbs.

——**VARIATION IN FORM.** The gradations in the structure of feathers are various and in some instances extreme, but even the hairs found upon the skin of fowls bear some relation to feathers in some particulars of their formation. The ordinary feathers, however, assume a variety of shapes and sizes, and in some measure supply characters for the distinction of species. Apart from formations peculiar to different breeds, in general it may be said that the varieties peculiar to the several parts of a fowl possess distinctive forms or outlines; and as such may be sufficiently indicated for our purpose. The hackles are rather long and narrow feathers, being more or less pointed, and those to which the unqualified term is usually applied are situated upon the neck; feathers of practically similar form, but rather more tapering, upon the posterior part of the cock's back, are termed saddle hackles. The hackles (of the neck) are common to both sexes, but the "saddle" of the cock is known as the "cushion" in the hen. In the tail the true tail feathers stand out rigid and straight in both sexes. In the cock the top pair or pairs, which are curved and come outside and fall beyond those of the tail, are called sickles. The tail coverts are also curved, but situated at the sides of the base of the tail proper—being smaller and of a softer texture than the sickles. The feathers on the shoulder of the wing are termed the wing-bow, from beneath which spring the broader wing coverts—which in turn cover the quills of the secondaries—the wing bar being a line of colour across the coverts. The secondaries are quill feathers, which cover the primaries when the wing is closed. The primaries or flight feathers are beyond and beneath the secondaries. The upper corner of the wing is the shoulder-butt, and the bottom end the lower-butt. The general characteristics of the breast feathers, those on the back, and those on the flat of the wing, are practically similar. Terms frequently used in connection with plumage are the under-colour, which has reference to the down seen when the feathers are raised; and self-colour, which means a uniform colour of plumage. Mossy is a word commonly employed to describe feathers with indistinct markings. There are also some remarks on this subject under "Colour in Plumage." (*See Frontispiece Plate No.* 55.)

FEATHER-EATING. Of all the tiresome things a poultry keeper has to contend with, nothing is more troublesome (when it gets a start) than the feather-eating nuisance. It is not a disease, but a bad habit, and it is most difficult to get rid of. One artful old hen will start it and will teach the trick to all the rest in the flock; the necks and rumps of every bird will quickly be denuded of feathers, and they will present a spectacle of the sorriest description—looking as though they belonged to the breed called "Naked-necks." The way in which the habit gets started is not difficult to understand. Two birds start fighting and cover themselves more or less with blood: others come and peck at the congealed blood on the necks of the combatants, and in doing so pull out some of the smaller feathers. These feathers are not only flavoured with dry blood, but they also have a flavouring of meaty matter at their roots, and this is, of course, very attractive to the cannibal palates of the "feather-eaters." As to curing it, a "gag" such as that illustrated is frequently used and is generally effective; equally so is the plan of wringing the neck of the teacher if she can be discovered in time, before she has taught it to the others; but if a number of birds are practising it, recourse must be had to other measures. The necks and rumps of the poultry should be dressed with some preparation calculated to discourage the habit. The best thing is a very strong solution of quassia, a very bitter substance, which is at the same time of a clean nature, and can be mopped on the feathers without injuring them. Another good plan, is to hang up cabbages in the runs just above the heads of the poultry so that they have to jump up in order to peck at them. Exercise of this sort, and the provision of scratching sheds and similar means of keeping the poultry employed, will do more than anything else to destroy the habit.

Gag used to Prevent Feather-Eating.
(*Cyphers Incubator Co.*)

FEEDING. GENERAL. It is safe to say that on correct feeding depends, in the main, the success or otherwise of any undertaking connected with live stock, and poultry farming is no exception. Of course, attention has to be paid to the housing, exercise, and general surroundings, but correct feeding is a *sine qua non*. Food (which as far as fowls are concerned, consists chiefly of dead animal and live or dead vegetable substances) is necessary to replace the constant waste that takes place in the body of a fowl, owing to the carrying out of the vital processes within it, and various other causes. If the fowl is to live, move and have its being, food must be supplied to it, for all these things involve waste of tissue, which must be replaced. Moreover, food is required for growth in the young, for heat in both young and old, and last but not least, to enable the female fowl to carry out the primary object of its existence, *viz.*, the reproduction of its species by means of eggs. It is not to be presumed that a hen lays eggs for the breakfast table of its own free will, and by special ordinance. The hen, which in a natural state would only lay the eggs it wished to sit upon, has by man's training and appropriation of its eggs, been forced to continue laying eggs for a much longer period during the year than would be the case in the natural state. And this point has to be constantly borne in mind where the feeding of fowls is concerned; for the unnatural prolongation of a natural process can only be secured by a constant supply of the material necessary for the carrying out of that process. If, as in the case of egg laying, the process involves a constant loss of a given or approximate amount of material, the whole question of feeding resolves itself into a simple question of the necessary amount of food for the upkeep of the fowl's body, plus that necessary for as constant supply of eggs as possible. To arrive at what food is necessary, the chemical side of the question must be entered upon. It must be known what are the chemical constituents of the body of the fowl, in order that the bodily waste can be supplied. Again it must be ascertained what are the chemical components of an egg before a constant supply of suitable material, in a digestible form, can be arranged for.

(1) The body of a fowl is composed of Carbon, Oxygen, Hydrogen, Nitrogen, Calcium, Phosphorus, Sulphur, Iron (in the blood), Chlorine, Potassium, Magnesium, Iodine.

The uses of the chief elements may be briefly summarised as follows:—Nitrogen mingles freely with the other elements, apparently supervising their activities, Oxygen is chiefly used up in bringing about combustion, and Carbon and Hydrogen are also used up in supporting combustion and keeping up the heat of the body, using up a great deal of Oxygen in doing so. The Salts and Sulphur, after doing their part of the work in connection with the vital processes, are excreted in the evacuations. Much of the Carbon is carried off, after use, by the lungs, but is partly excreted in the evacuations.

(2) An egg is composed as follows:—(White) Albuminoids 12·0, Fats 2·0, Carbohydrates 0·0, Mineral Matter 1·2, and Water 84·8 per cent. (Yolk) Albuminoids 10·0, Fats 30, Carbohydrates 0·0, Mineral Matter 1·0 and Water 53 per cent.

Here is a simple problem, to the successful solution of which there are many aids, the result of human thought and practical experience. First, it is necessary to supply these chemical constituents in a digestible form. Second, it is necessary to know the analysis of the various foods, in order to ascertain the form in which to supply the given requisites. Third, it is necessary to know in what quantities to supply. On all these points definite conclusions have been arrived at. The minor chemical constituents are contained in small quantities in many forms of foods, and it is only necessary for the poultry keeper to concern himself with the principal elements that are necessary for his purposes and which have already been clearly defined.

The next point is to discover what foods contain these necessary elements in a digestible form. All foods have been analysed and their known ingredients classified under certain headings, which denote to what extent they supply the chemical compounds that are necessary to replace the waste tissue, and to enable the fowl to carry out its life's work. It may be said here, that the necessary ingredients can be found both in the animal and vegetable kingdom. But experience has proved that it is better to use both animal and vegetable food for the purpose, for the fowl is, and always has been, almost omnivorous.

Broadly speaking the component parts of each food have been classified under six headings, viz.:

(1) The Nitrogenous Class. (2) Th Hydrocarbons. (3) The Carbohydrates. (4) Cellulose. (5) Mineral Matter. (6) Water.

Class (1). The Nitrogenous class comprises albumen and similar substances. Thus grain contains Albumen in the form of gluten, milk in that of casein, while fibrin is the flesh-forming, or Nitrogenous portion of animal food.

Class (2). The Fats and Oils otherwise called the Hydrocarbons, because they are rich in carbon. This class is found in the form of fat in animals and Fats and Oils in nearly all grains and vegetables. From this class is derived much of the necessary energy and heat.

Class (3) named the Carbohydrates, such as sugar, starch, and gum, are contained chiefly in the vegetable kingdom, and they also supply heat and energy.

Class (4) consists of what is known as cellulose. This, in the form of husk, is contained in most grains and vegetables. While it is similar to starch, it is not of much value as a food, so in analysis is usually classed by itself.

Class (5). Salts or Mineral Matter. The principal of these are Lime, Sulphur, Phosphorus and the Alkaline Salts. The feathers need Sulphur, while Lime and Phosphorus go to build up the frame work.

Class (6). Water. This is contained in all the foods, moist or dry, even the driest grain.

Now seeing that all food is classified as above, the next step in order to know what foods, and how much of them, to give, is to determine what proportion the Albuminoids, or flesh-formers, should assume as compared to the Fats and Carbohydrates, or heat and energy producers.

This has been decided as follows:—That the proportion of Albuminoids to Carbohydrates should be 1 to 5. Some authorities say 1 to 4½ in Summer, and 1 to 5 in Winter, more Carbohydrates being required in cold weather. But it must be made clear that these figures apply to the Hydrocarbons when added to the Carbohydrates after having been multiplied by 2½. The reason for this is that it is considered that Fats and Oils (Hydrocarbons) are more fattening, and produce more heat than Carbohydrates, being richer in Carbon. It is thought, after many experiments, that the equivalent of heat produced by the two groups is the figure that best represents this difference; therefore, the Hydrocarbons are multiplied by 2·5 or 2½, and the result is then added to the amount of the Carbohydrates, in any given food, and the whole considered as Carbohydrates. This simplifies matters, and if in any given food it is desired to discover what proportion the Albuminoids or flesh-formers bear to the Carbohydrates, or heat and energy producers, all that is necessary to be done is to multiply the Fats and Oils (Hydrocarbons) by 2½, to give them their full value as compared to Carbohydrates, then add them to the Carbohydrates, and finally divide the results by the Albuminoids. (*See* "Nutritive Ratios.") The different foods will be found under their different headings; but it will be well to say a word here about the number of meals that should be given to birds according to season and surroundings. A bird in confinement naturally requires more food than a bird on free range. One soft and one hard meal a day, and meat or a little grain and green stuff at mid-day, would not be too much for birds in close confinement. Birds on grass lands in Summer, should have usually two meals a day. It is not always necessary to give soft food in the morning to birds on free range in Summer-time, and meat is usually unnecessary, as they get plenty of grubs, insects and worms. Birds that are being run on stubble, after reaping, frequently want no food at all, and where it is necessary, it is better to give soft food. The crops of birds feeding on stubble should be watched, or felt at night, if there is any doubt about what quantity of grain they are picking up, as it is difficult to judge whether they are hungry merely by the fact that they will run if they see their feeder approach. This running is often the result of habit, and the grain thrown down may not be required.

—— **NUTRITIVE RATIOS.** By Nutritive Ratio is meant the proportion that the Albuminoids bear to the Fats and Carbohydrates. This is arrived at in the following way. It is known that the Fats produce far more adipose tissue than do the Carbohydrates, and they contain more carbon. Therefore, it is thought that if the Hydrocarbons or Fats are multiplied by 2½, which is the difference in heat produced by the two groups, a better idea of the real comparative value of this class is arrived at. So the Fats or Hydrocarbons are multiplied by 2·5 or 2½, and then added to the Carbohydrates, and the result gives the real nutritive ratio. Here is an example: Middlings contain 16·0 Albuminoids, 4·0 Fats, and 57·0 Carbohydrates. Now if the Fats 4·0 are multiplied by 2½, the result will be $4 \times 2\frac{1}{2} = \frac{4}{1} \times \frac{5}{2} = 10$, and if the Carbo-hydrates are added, the result will be as follows :—

$$\begin{array}{r} 10 \\ \underline{57} \\ 67 \end{array}$$

All that is now necessary is to divide this 67 by the Albuminoids, thus

$$\begin{array}{r} 16)67(4 \\ \underline{64} \\ 3 \end{array}$$

which gives the proportion as between the Albuminoids, and the Hydrocarbons and Carbohydrates in Middlings, *viz.*, 1 to 4. When a dietary is so arranged that the Albuminoids are in correct proportion to the Fats and Carbohydrates, then that dietary is said to be properly proportioned, or technically "balanced." It is to be noted that in balancing diets for poultry, husk is not reckoned, as it is not digestible, although no doubt some small nourishment is derived from it. There is no doubt that in the adult fowl it exercises a beneficial and mechanical action on the bowels, acting as a stimulant and tending to laxity. A very large number of experiments have been carried out with a view to determining what the nutritive ratio should be, and it has been decided that to properly sustain life it should be 1 to 5. Some authorities say that the actual figures should be Albuminoids 18, Fats 7, and Carbohydrates 75; which is practically, Albuminoids 1, Carbohydrates 5. It is, however, considered best to feed in the ratio of 1 to 4½ for summer weather, increasing the Carbohydrates in winter to 5. But one must remember that this is only a living ration; it is not a laying ration. In order to get a good supply of eggs it is necessary to add, if the fowl cannot get it, a sufficient quantity of Albumen, in one form or another, to supply the extra material for egg production.

—— **TABLES.** For the convenience of those who do not wish to work out Nutritive Ratios, a number of food tables collected from various sources are given below.

The nutritive ratio of the day's ration is ascertained by putting down the nutritive ratios of all the foods used and adding them together. But one must be careful to divide or multiply the figures of each item so as to give the correct proportion in which each food stuff is used. For instance :—

	Alb	Fats	Car H	Salts	Water.
2 lbs. Topps. (×2)	32	8	114	9	28
1 lb. Barley meal	12	3·2	56	38·6	13
1 pt. Fresh Cut Bone	20·2	58·7	0·0	24·0	29·7
	64·2	69·9	170		

Note that the Carbohydrates are here added together

$$\begin{array}{r} 170 \\ \underline{69{\cdot}9} \\ 64)239{\cdot}9(3 \\ \underline{192} \\ 47 = 1 \text{ to } 3 \end{array}$$

Here the C H s are divided by the Albuminoids

(nearly 1 to 3¾)

This is the nutritive ratio

We find here that the Albuminoids are in excess, therefore, the evening feed must be of a grain that will bring up the amount of Carbohydrates as near as possible to 1 to 5. Now let us take wheat. Wheat has 12 Albuminoids, 4·0 Fats, 70·1 Carbohydrates.

It will be found that the addition of wheat to the day's ration will bring the ratio up to about 1 to 5·1. It is a little over 1 to 5, but this does not matter.

Here is another, taken from Lewis Wright :—

	Alb.	Fats.	Car. H.
3 lbs. Maize (×3)	31·5	54·	199·5
1 lb. Horse Flesh	21·7	5·8	0·0
2 lbs. Ground Oats (2)	30	24·8	96·0
	83·2	84·6	295·5

$$\begin{array}{r} 295{\cdot}5 \\ \underline{84{\cdot}6} \\ 83)380{\cdot}1(4{\cdot}5 \\ \underline{332} \\ 48{\cdot} \end{array}$$

This is a ratio of 1 to 4½.

Now if oats are given for the evening meal it will bring the ratio up to a little over 4½, thus :—

```
Oats 15 + 83          12·4 + 48·
     83                      12·4
                            380
     98                     ———
                         98)440·4(4½
                            392

                             48
```

Here is one with potatoes :—

	Alb	Fats × 2¼	C H 's	Salts
2 lbs. Potatoes	13·0	0·0	82·0	4·0
¾ ,, Malt Sprouts	17·4	2·8	36·4	4·3
2 ,, Oats	30·0	24·8	96·0	5·0
	60·4	27·6	214·4	13·3
		plus	27·6	
			242·0	

Here the potatoes being watery, Lewis Wright places 2¾ lbs. of mash against 2 lbs. of dry oats for the evening meal, which brings the ratio up to 1 to 4.

Here is a mash of bran and potatoes :—

	Alb	Fats × 2¼	C H 's	Salts
1 lb. Potatoes	6·5	0·0	41·0	2·0
Bran	15·5	9·0	44·0	6·0
	22·0	9·0	85·0	8·0
		plus	9·0	
			94·0	

The ratio here works out at 1 to 4½.

Here is a very ordinary mash :—

	Alb	Fats × 2¼	C.H 's	Salts
1 lb. Sharps	16·0	9·0	57·0	4·5
1 ,, Barley meal	12·0	3·2	56·0	3·6
	28·0	12·2	113·0	8·1
			12·2	
			125 2	

The ratio here is 1 to 4½. There is a deficiency in fat, so it would be better to have 2 parts of sharps to one of barley meal, or add a little fat, or give maize for the evening meal.

In America a very popular mash is composed as follows :—

	Alb	Fats × 2¼	C H 's	Salts
1 lb. Maize meal.	10·5	18·0	66·5	1·5
2 lbs. Bran	31·0	18·0	88·0	12·0
	41·5	36·0	154·5	13·5
		plus	36·0	
			190·5	

This works out at 1 to 4½.

Lewis Wright advises the following where birds are on good wide grass range :—

	Alb	Fats × 2¼	C H 's	Salts
1 lb. Heavy Oats	15·0	12·4	48·0	2·5
1 lb. Buckwheat	10·0	5·0	62·2	2·0
	25·0	17·4	110·2	4·5
		plus	17·4	
			127·6	

This ratio (25 to 127) works out at very nearly 1 to 5.

Here is a dietary given by Dr. Green, balanced, and showing the different percentages of each constituent :—

	Alb	Car	M S	Water		
2 Parts Toppings	36·	126	10	28	=	200
1 part Barley M.	12	73	3	12	=	100
1 pt. Meat scraps	16	18	4	62	=	100
Per cent. of relative mat.	4)64	217	17	102		400
	16	54¼	4¼	25½	=	100

It will at once be seen, if compared with the figures given farther back, that the Nitrogenous materials are in excess, while the Carbohydrates are deficient. Therefore, a grain must be chosen for the evening feed that will counterbalance these defects. Wheat will again do this :—

Evening meal wheat	12	74	2	12	=	100
Morning meal was	16	54¼	4¼	25½	=	100
Per cent of relative mat.	2)28	128¼	6¼	37½		200
	14	64⅛	3⅛	18¾		100

The limits of the percentage of the four necessary constituents of food are :—

Nitrogenous	12	to	15	per cent.
Carbonaceous	55	,,	65	,,
Salts	1	,,	4	,,
Water...............	32	,	16	,,

So that here is a day's dietary well within the mark.

Potatoes are often handy, so let us take a soft meal containing potatoes :—

	Alb	Fat	C H	Salts
1 lb. Potatoes	6·5	0·0	41·0	2·0
1 lb. Bran	15·5	9·0	44·0	6·0
	22·0	9·0	85·0	8·0
			9·0	

```
22)94· (4
   88
   ——
    6
```

There is a deficiency in fat here. Using maize, therefore, for the evening meal we find that it works out at 1 to 5.

	Alb.	Fats	C.H.	Salts
Maize being	10·5	4	72·5	1·9

Here is a set of meals taken from the Board of Agriculture's leaflet on feeding. The foods are arranged so that each one balances the other, and the nett result is that they form a perfect dietary, producing heat, flesh, fat, bone, muscle, feather and eggs, in due proportion. The mixtures should be varied as much as possible. The quantities given will be found sufficient for a pen of ten birds of ordinary size, but Brahmas or Cochins would require rather more food. This can easily be added in due proportion to the morning and evening feeds.

N.B.—One ounce of table salt should be added to the allowance of every 100 birds. If more food be given for the morning feed (see Nos. 7, 8, and 9), less must be given at mid-day.

FOOD FOR PENS OF TEN FOWLS (AVERAGING ABOUT 6 LB. IN WEIGHT EACH) FROM THE COMMENCEMENT OF THE LAYING SEASON.

	MORNING.		MID-DAY.		EVENING.	
	Weight of Food. Ounces.	Foodstuff.	Weight of Food. Ounces.	Grain.	Weight of Food. Ounces.	Grain.
	2	Lean meat		oats	15	barley
	3	Cabbage				
	*5	Sharps (middlings)				
	2	Cut green bone		oats	15	wheat
	2	Clover chaff				
	3	Barley meal				
	*3	Bran				
	2	Lean meat	12	barley	15	wheat
	*3	Bran				
	*3	Cut clover hay				
	2	Barley meal				
	2	Cut raw bone	12	oats	15	Maize
	*3	Bran				
	3	Chopped cabbage				
	2	Sharps (middlings)				
		Meat meal	12	barley	15	wheat
	*3	Bran				
	3	Chopped cabbage				
	2	Boiled potatoes				
6.	2	Lean meat	12	oats	15	maize
	*3	Cut hay chaff				
	*3	Bran				
	2	Pea or bean meal				
7.	*3	Bran	10	barley	15	maize
	3	Chopped cabbage				
	4	Rough oatmeal				
	2	Lean meat				
8.	*3	Bran	10	oats	15	wheat
	3	Cut green grass				
	2	Buckweat meal				
	2	Barley meal				
	2	Cut green bones				
9.	*2	Bran	10	barley	15	barley
	3	Barley meal				
	4	Rough oatmeal				
	*3	Cut hay chaff				

Those marked thus (*) should be scalded.

—— WINTER FOOD FOR LAYING HENS. For laying hens during the winter, a very good morning food mixture can be made as follows :—

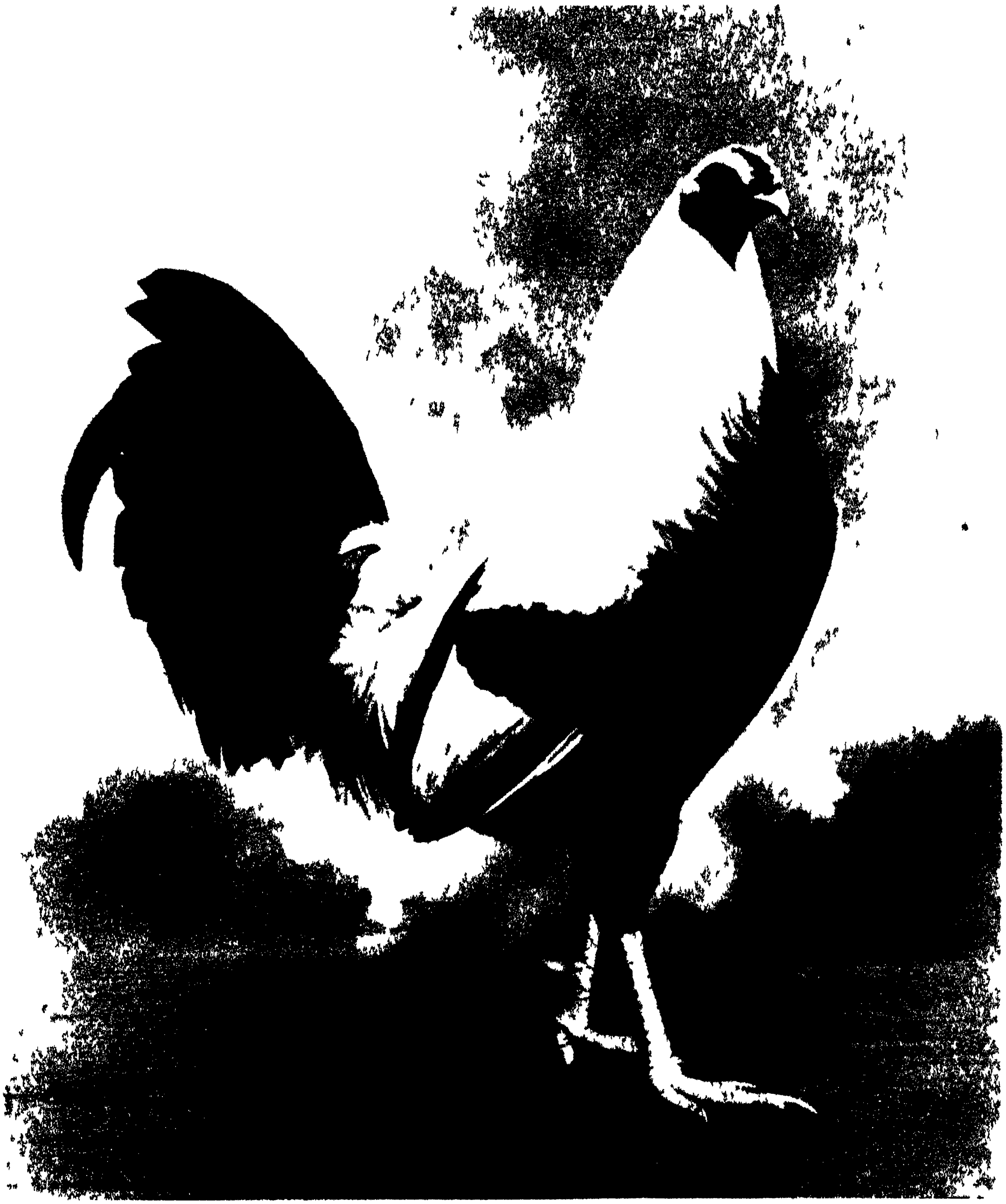
Scalded bran	4	parts
Well-cooked maize meal	2	
Pea meal	2	,,
Sharps	1	part
Cooked lean meat	1	,,
Chopped and scalded clover hay	2	parts

with a light mid-day feed of oats or barley, and an evening feed of either wheat or buckwheat, or if the weather be very cold, of broken maize.

The mid-day grain should be scattered among litter so that the birds may be forced to take a fair amount of exercise. Quite a small space, comparatively speaking, will do for this purpose, but it must be light, and, as far as possible, sheltered.

—— DRY FOOD MIXTURE. The dry system of feeding chickens consists of feeding on a mixture of seeds, grains and meat, for a period varying from three to eight weeks, when soft food is added to the diet. No egg food need be given at all. The following is the

PLATE NO. 40



Old English Silver Duckwing Game Cock.

(Bred and exhibited by Mr Robert Pashley The Kerne Lodge Ross)

Winner of 1st and Special best O E Game Cock Crystal Palace 1907 1st Birmingham 1907 1st and two Specials O E Game Fowl Club Show Oxford 1907 1st and Special as best in Welsh United Game Club Show 1907 1st Crystal Palace 1908, 1st and Special Birmingham 1908 etc.

system as carried out on the College Poultry Farm, Theale, Berks, and as advised by Edward Brown. For the first four weeks the following mixture is given :—

(A). (First four weeks) :—

DRY CHICK FOOD MIXTURE.

BY WEIGHT.

Wheat (cracked)	3	parts
Dari	2	,,
Canary seed	2	,,
Oatmeal	2	,,
Millet	2	,,
Broken maize		
Hempseed or Buckwheat		
Rice		
Meat		
Grit		,,

To make 1 cwt., 1 part equals 7 lbs.
Cost 10/8 per cwt. (1·14d. per lb.).

(B). Dry Food Mixture (after four weeks) :—

BY WEIGHT.

Wheat (cracked)	3	part
Broken maize	2	,,
Dari	2	
Buckwheat	2	
Rice	2	
Hempseed	1	
Meat	1	
Linseed	1	
Grit and Oyster shell	1	

Cost 7/6 per cwt. (0·8d. per lb.)

(C). Soft Food (after eight weeks) :—

BY WEIGHT.

Barley meal	4	parts
Toppings	4	,,
Meat	1	part

Cost 7/6 per cwt. (0·83d. per lb.)

(D). Biscuit meal.

Get a good Biscuit meal (pricc varying).

(E). Wheat.

7/0 per cwt. 1¾d. (0·75d.) per lb.

In feeding, the soft food is only supplied in quantities that will be cleared up. The hard corn can be left about, for from half to three-quarters of an hour, and then removed. Green food must be supplied if the chicks have no grass run, and should be given after the hard food.

The following mixtures are advised in the pamphlet issued by the Board of Agriculture on "Poultry Feeding." For the first eight days :—

DRY CHICK FOOD MIXTURE.

Canary seed	3	parts
Millet seed	3	,,
Finely cracked peas (green are best)	2	,,
Hempseed	1	part

Or the following :—

Canary seed	3	parts
Groats	3	,,
Finely cracked peas	2	,,
Hempseed	1	part

The chickens may be fed entirely on canary seed and groats, if desired ; but if so fed, the groats should be given separately. If the above mixtures are given, no change is necessary until the birds are fully eight days old. From that time until twenty-one days old the birds will grow faster, if to these foods be added finely broken wheat, broken white rice (in very small quantities), and yellow maize (finely cracked). A good proportion would be as follows :—

DRY CHICK FOOD MIXTURE.

Rough oatmeal	7	parts
Finely cracked wheat	8	
,, ,, maize	4	
,, ,, Green peas	4	
Canary seed	2	
Millet seed	2	
Hempseed	2	
Finely broken white rice	1	part

For soft food from eight weeks to eighteen weeks (if kept for stock), or until put up to fatten, the birds may be given :

SOFT FOOD FOR YOUNG BIRDS.

(1)	Scalded biscuit meal	1	part
	Scalded bran	1	,,
	Pea or bean meal	1	,,
	Barley meal	1	,,
	Buckwheat meal	1	,,

The evening meal in this case should consist of groats.

Or (2)	Scalded bran	2	parts
	Barley meal	2	,,
	Scalded sharps	1	part

The evening meal to consist of cracked wheat.

Or (3)	Scalded bran	2	parts
	Oatmeal	1	part
	Scalded sharps	1	,,

The evening meal to consist of dari or cracked maize.

It is advised to feed this soft food three times daily, and in addition to give one meal a day of cooked lean meat, and as much green food as the birds will eat. If kept for stock, they may be fed from eighteen weeks until they begin to lay on any of the above foods, but need only be given two soft meals a day instead of three. Experiments have recently been made at the College Poultry Farm, Theale, on the feeding of adult fowls on an entirely dry system of feeding. Grain is given in the usual way, while meals and meat, etc., are mixed together in the dry state, and given to the birds in troughs. But there has been no universal adoption of this system up-to-date.

—— **ANIMAL FOOD.** It has been proved beyond doubt that animal food is essential to the well-being of fowls. Experiments have been carried out that have conclusively demonstrated this fact. And it is easily understood. A fowl living in a state of nature naturally devours all the worms, grubs and insects, that it comes across, as well as seeds, grains and grass, and thrives on the mixed diet. It is well to follow nature as closely as possible. In no way can a hen be given the albuminous food, necessary for the laying of eggs, so readily, and in such an easily assimilated form as by a small daily meat ration. Where birds are on free range, and where they can obtain plenty of worms and insects a meat ration is unnecessary. But in winter when insects are not to be found, meat should be supplied. Where birds are closely confined, meat will be required by them at all seasons. Too much meat, however, is bad, and when given in the form of meat meals, in excess, invariably leads to digestive disorders. Animal food may be given in the form of Fresh Meat, Dried or Granulated Meat, Meat Powder (*see* "Meat"), or it may be given in the form of Bone meal (*see* "Bone meal") or Green Cut Bone (*see* "Green Cut Bone.")

—— **MILK.** Milk in poultry feeding is used chiefly for chickens and fattening. Chickens do well if given a drink of milk once or twice a day, care being taken that it is removed immediately they have satisfied their thirst, and is never given them in a soured state. Also where egg and breadcrumb is given for the first day, it is usual to moisten the mixture with milk. Adult birds may have their soft food mixed with milk, or skimmed milk with advantage, but it is not often done on account of the expense. After all, the main use of milk as a poultry food consists in the mixing of milk with meals for the use of fowls that are being fattened. And for that purpose milk is unequalled. It is generally used in the soured state for this purpose, and usually in the skimmed form. The souring is absolutely essential to the proper fattening of fowls, as the chemical changes that take place when milk becomes sour makes it exercise a beneficial effect on the digestive systems of the birds, keeps their bowels in order, and enables them to stand the long confinement and strain better than if fresh milk is given. (*See* "Milk" under the head of "Feeding stuffs.")

—— **OVER-FEEDING.** Over-feeding is a mistake from all points of view. (1) It is bad for a bird's health; (2) Bad for egg production; and (3) Bad even for birds intended for the table or market, when they are young. In case No. 1, it leads to inactivity, the laying on of adipose tissue, and eventually to liver and other diseases, owing to the strain put upon the system in striving to eliminate the poisonous products created by the excess. As regards No. 2. It affects egg production by surrounding the internal organs with adipose tissue, and so impedes their action; no inactive bird is a good layer, and no fat bird is an active bird. No. 3. Over-feeding is bad for birds intended for fattening when young, because it interferes with their growth. They must be kept "moving," that is, growing, until they are ready for the fattening pens. They want frame, not fat, and they should reach the pens with good healthy livers and internal organs generally, or they will not bear the great strain that fattening imposes on the system. Almost. it would be better to underfeed, but both are bad, and the golden mean should be the aim: food enough for all bodily requirements and a little over as a reserve fund, plus the requisite amount to produce eggs.

—— **SOFT FOOD.** Soft food usually means foods that require mixing with liquid, whether water, gravy, blood or milk, etc. The principal foods thus mixed are the meals, such as middlings, sharps, bran, pollard, barley meal, ground oats, pea and bean meal, etc. Other foods requiring liquid mixing and soaking, are biscuit meal, malt culms and such like. The principal point to be observed about the preparation of soft food, is that it should not be too moist. In practically every case, except in the case of fattening food, the consistency should be what is known as "crumbly." The test for this is that when a handful of soft food is made into a ball and thrown against a wall or on the ground, it should break and scatter, and not adhere to wall or ground in one mass, like putty. The advantages of soft food are that it is more easily digested and therefore nourishes more rapidly than hard grain. It has been proved that soft food increases growth more than hard food, and where size is a desideratum, this should be borne in mind. There have been many controversies as to whether soft food should be given in the morning or evening; but the consensus of opinion inclines towards the former.

—— **QUANTITY IN FEEDING.** Quantity in feeding depends upon age, breed, season, surroundings and state of health. The phrase "individual requirements," would probably best and most tersely state the case, for like human beings, over and above the above-named qualifications as to quantity, birds' appetites vary from day to day. The main guides to quantity are undoubtedly those enumerated above, amplified by considerations as to the condition a bird is in with regard to its natural function, *viz.*, laying. A bird that is in lay, requires more food than a bird that is not, because when it is "in lay" it requires food for its own upkeep, and a certain amount over and above that to produce eggs with. It is reckoned that most fowls fed in a rational manner receive sufficient food for their own sustenance and perhaps a little over. This little bit over is turned into eggs. If, however, more eggs are required, the usual diet must be supplemented, and this is best done by the addition of animal food. To give some guide as to quantity it may be stated that a handful of grain clutched with the fingers pointed downwards (known as a lady's handful), is regarded as an average quantity of grain for an average bird. A pint measure will feed 10 average birds; a half-pint tumbler 5; a gallon bucket of grain is sufficient for 30 average birds; a 2-gallon bucket feeds 60. It will be found that half-a-pint of dry meal will be sufficient when mixed to feed two average birds; one pint 4 birds; one quart 8 birds; one gallon 30 odd. When large numbers are being fed it is only possible to gauge roughly, for 30 birds would one day consume a gallon of food and the next day only three-quarters, and so on. The great point is to collect all soft food, which should be fed in troughs, as soon as the birds leave the troughs. It is better not to give a heavy meal in the morning. After a morning or two an average amount can be fixed.

FEEDING STUFFS.* **FAT.** A greasy, easily melted compound forming part of animal tissue and also contained in many plants. Fats consist of palmitic, stearic, and oleic acids, combined with glycerin, forming respectively palmitin, stearin and olein. Fats usually contain two or more of these, and as the first two are solid, and the last liquid, the solidity of fat depends upon the proportions in which these substances are mixed. Fat is added to poultry food in the form of mutton fat, for fattening purposes. Greaves (*see* "Greaves") are also used for ducks and fowls. Fat scraps may be boiled down and added to the soft food.

---

* Note. The analyses given in this article are based on averages. There are necessarily slight variations in different samples. With grain, for instance, its maturity and the soil on which it was grown will influence results.

——**MILK.** Cow's milk is useful in moistening food for young chickens, and a drink of milk once or twice a day will show marked results. The great danger of its use in the case of chickens is that it is liable to turn sour and cause intestinal trouble. In the case of adult birds milk or skimmed milk would be very beneficial if mixed with the soft food, and would go far towards supplying the egg ration in place of meat, but expense stands in the way of its being much used. The principal use that milk is put to is in the fattening of fowls for the table and market. Nothing makes the flesh of fowls so tender, juicy and white, as the judicious use of milk. The best form in which to use milk for fattening is in the skimmed state, and it should be allowed to stand until it sours, because in this form it keeps the bowels open, taking the place of green vegetables. The chemical action of the soured milk is a great factor in successful fattening. On fresh milk birds will not fatten so well, and are more liable to breakdown under the process or take to feather-eating, and other vices. The analysis of a fair average milk is: Water 86·90, Fat 3·60, Casein and Albumen 4·75, Milk Sugar 4·00, Mineral Matter 0·75.

——**BARLEY.** Barley may be said to be highly nutritious; it is especially rich in phosphoric acid, but is deficient in gluten.

It is thought by many experts to induce liver disease in poultry, especially if given freely to birds on a damp soil, and in confinement. The analysis of Barley is as follows:—
Albuminoids 12·0 %, Fats and Oils 1·4, Carbohydrates 56·0, Mineral Matters 3·6, Husk or Fibre 14·0, Water 13·0.

——**BLOOD.** Blood is very useful as a poultry food. It may be collected in pails from the slaughter house, and then boiled. In order to do this it is necessary to cut up the clots with an iron spoon, and then drop them into boiling water, that must be kept on the boil. This turns the clots a brownish colour. After boiling it will keep for eight days or so in winter, and three or four days in summer. If used at once, it may be mixed with the dry meals. Blood boiled in water contains 70 to 90 % of water. Another way to keep blood is to heat it up to 100° F., and then press it, and dry it in an oven, or in the sun. Blood usually contains 20·9 % nitrogenous matters, 1 % of fatty matters, 9·8 % of mineral matter. After desiccation blood may contain 75 to 80 % of nitrogenous matters and 13 to 14 % of water.

——**BONEMEAL.** Dry bonemeal is given to young chickens to increase or hasten growth. Whereas green cut bone increases the laying capacity of a hen, dry bonemeal is not considered to do so. It is a good thing in cases of diarrhœa. A good mixture for growing chickens is one ounce of bonemeal to each half-pint of dry cereal meal before mixing. This bonemeal is often adulterated and sometimes consists of the refuse of the button factories, where the bone is treated chemically. Dry bonemeal is given for the phosphates it contains, whereas green cut bone has a high nutritive ratio.

——**GREEN CUT BONE.** Amongst egg producing foods green cut bone stands deservedly high. It has a very fine analysis: Albuminoids 20·2, Fats and Oils 20·1, Carbohydrates 0·0, Mineral Salts

24·0, Husk or Fibre 0·0, Water 29·7. It will be seen at once that it is a more valuable egg producing food than lean beef if analysis counts for anything, as it almost equals beef in Albuminoids, but excels it by many points in Fats and Oils (the figures being 3·5 and 20·1), while in Mineral Matters it is also far ahead, lean beef being 1·6 and fresh-cut bone 24·0. The bone can be procured from a butcher and should then be cut up in a special machine or cutter sold for that purpose. It may be used mixed with the soft food, or given alone in wooden troughs. In America they give it to the fowls mixed with clover. It may be noted that shoulder blades contain very much less nutriment than thigh and other large bones, which contain much marrow and oil, the former should therefore be avoided.

——**BUCKWHEAT.** This grain is used both for poultry and pheasants. It is rather poor in Nitrogenous substances. The full analysis is as follows:—Albuminoids 10·0, Fat 2·0, Carbohydrates 62·2, Mineral Salts 2·0, Husk or Flour 11·0, Water 12·0. In France with wheat it constitutes the main poultry diet, and it is claimed over there that it produces very white flesh, when used for fattening purposes. The best Buckwheat is what is known as the "full" grey French, care should also be taken to avoid brown, light, Buckwheat, which has been kiln-dried.

——**GRAIN.** A term used collectively for any of the common cereals, either as growing plants, or as seeds in bulk, either in sacks, etc., or growing in a field (*see* "Wheat, Oats, etc.)"

——**GREAVES.** Pieces of boiled tallow-scrap, cracklings. The refuse after tallow or lard has been made. Used for both fowls and ducks. In the case of the latter, it is usually boiled down with rice.

——**MAIZE OR INDIAN CORN** is a useful poultry food, but must be used in moderation and with care. There are something like 300 varieties, but the principal ones used for poultry, are as follows: River Plate, Cinquautina and Odessa. The River Plate Maize is large and flat and needs crushing before using. The Odessa and Cinquautina are much smaller. Maize is rich in fats, and given in excess is thought to produce liver disease and lay on fat internally, which would tend to decrease egg production. This tendency to produce yellow fat is the reason that it is not used largely for fattening purposes, although it is sometimes mixed in with ground oats and middlings. For birds in close confinement it is undoubtedly a dangerous article of diet.

—**MEAT.** Two forms of meat are used for poultry, fresh and prepared. Fresh Meat usually takes the form of liver and paunch, odds and ends from the block, horse flesh, and household scraps. All are good in their way. Meat is usually boiled down and then cut up and mixed in with the soft food; the gravy being used for the mixing. Or a good way to use it is to cut it up into dice and give it at mid-day in troughs by itself. The gravy can be used for the morning meal as in the first instance. Of course, meat may be given raw; but such portions as liver and paunch are better given in the cooked state. Prepared Meat usually takes the form of granulated meat, or meat powder. The meat is first dried and then broken, ground, or cut up in one form or another. Much of this meat comes from the stock yards abroad, some is horseflesh, and more is the residue after soups, essences, gravies, etc., have been made. Some of these preparations are very useful. The analysis of Dry Meat Meal is Albuminoids 71·2, Fats and Oils 13·7, Carbohydrates 0·3, Mineral Matters 4·1, Husk 0·0, Water 10·7. The analysis of Lean Beef is Albuminoids 20·5, Fats and Oils 3·5, Carbohydrates 0·0, Mineral Salts 1·6, Husk or Fibre 0·0, and Water 74·4. The analysis of Horseflesh is Albuminoids 21·7, Fats and Oils 2·6, Carbohydrates 0·0, Mineral Salts 1·4, Husk or Fibre 0·0, Water 74·3.

——**MEALS.** The term meal is applied to comparatively coarsely ground grain, such as Barley Meal, Middlings, etc. See under respective headings.

——**MIDDLINGS.** The coarser part of ground wheat, as distinguished from flour and bran, formerly used only for food, but now often manufactured into the best brand of flour since it contains most gluten. Few meals vary so much as Middlings. Sometimes they are very fine, with a high nutritive ratio, and at other times they are coarse and poor. They should contain a proportion of the flour to be of first quality, whereas they are often only found to be nothing more than pollard or fine bran. Middlings are a most valuable food when an analysis shows that they contain the proper ingredients. A fair analysis is as follows: Albuminoids 16·0, Fats and Oils 4·0, Carbohydrates 57·0, Mineral Matters 4·5, Husk or Fibre 4·5, Water 14·0. A sample showing such an analysis would be soft and mealy, and would not feel hard when run through the fingers. The term Middlings is used in some parts of the country for the same article that is called toppings, sharps, blues, boxings, pollards and various other names in other parts. There appears to be no clearly defined standard for this meal. It is used as a soft food for fowls and chickens, etc., usually mixed with barley meal, ground oats, pea meal, etc., and to dry off biscuit meal, malt culms, etc. Taken generally it may be considered the most useful meal for young and adult stock feeding. (*See* "Wheat.")

——**OATS.** The oat is regarded as one of the very best foods in existence, whether for man, beast, or bird. With an analysis as follows: Albuminoids 15·0, Fats and Oils 5·5, Carbohydrates 48·0, Mineral Matters 2·5, Husk and Fibre 19·0, and Water 10·0, it has few rivals. The one drawback to the oat is the large amount of husk it carries. But this does not count in the case of hulled oats, split groats, oatmeal, etc., where it is absent, while in the case of Sussex ground oats, it is ground so fine that it is not noticeable. For chickens, ground oats, pin head oatmeal, split groats (*i.e.*, a groat split into three parts) and groats are most suitable, and are used in large quantities for rearing purposes. For adult fowls, whole oats, or "clipped" oats are most suitable. "Clipped" oats are oats that have had the husky extremities cut off. It is well to use an oat that has a small husk, such as the White Russian, but a heavy English winter oat is a good one. Black oats are not so suitable. Ground oats is the chief fattening meal. (*See* "Ground Oats.")

——**OATMEAL.** Oatmeal, which is the ground meal of the oat having been first hulled and then dried, is a very fine food indeed. It has a nutritive ratio of about 1 to 4⅓. It is used mostly for young chickens. There are various grades of oatmeal: fine, coarse or pin-head. (*See* "Oats" and "Ground Oats.") The analysis of Oatmeal is: Albuminoids 18· % Fats and Oils 6·0, Carbo-hydrates 63·5, Mineral Matters 2·, Husks or Fibre 1·5, Water 9·0.

——**SUSSEX OATS.** "Sussex" is the name given to a mixture composed of eight sacks of oats to one of barley, ground to a very fine consistency by means of specially dressed mill stones. The sack of barley is added because of the dry nature of that grain as compared with oats, which are oily, to assist in the process of grinding. No meal or food fattens fowls so well as Sussex ground oats, or produces such white juicy flesh when used in combination with soured skimmed milk. It gets the name "Sussex," because the mills that turn it out are situated mainly in that county, especially in or about Heathfield, although the Kentish mills turn out a good deal of the commodity.

——**POLLARD.** Coarse wheat flour or bran. The term Pollard is used for vastly different bye-products of wheat throughout the country. Sometimes what is termed middlings or sharps in one part of the country, goes under the name Pollard in others. If Pollard is taken to mean bran, it would have an analysis as follows: Albuminoids 15·5, Fats and Oils 4·0, Carbohydrates 44·0, Mineral Matters 6·0, Husk or Fibre 10·5, Water 14·0, which is a very high one. It might be better if the term Pollard were applied to the finer sorts of bran only, and not to the big square cells which contain large quantities of gluten, and which are so apt to adhere together after milling. Thus the large stuff might be termed bran, the smaller pollard, and the next in fineness sharps or middlings, still further graded by the adjectives fine, or coarse. As it is, Pollard is the name applied varyingly to anything from sharps to large bran. Taking the term to mean bran of various grades, it must be considered an excellent, highly nutritious addition to poultry dietary. It is naturally somewhat indigestible, but if well cooked by being scalded with boiling water, and then dried off with middlings, it makes a capital soft meal. One great objection to Pollard or bran, is that it quickly absorbs moisture, and then fermentation sets in. To obviate this, it is necessary to keep it in a dry store, and in dry bins. Also, it is advisable to buy it in small quantities, and so ensure freshness and sweetness.

——**SHARPS.** The coarser part of ground wheat as distinguished from flour and bran. The terms middlings, sharps, boxing and toppings are often used synonymously, according to local usage. (*See* "Middlings" and "Wheat.")

——**RICE.** The grain of an annual grass of which there are many varieties, varying greatly in the time they take to arrive at maturity. The grain consists of flattened dry cells, which on cutting show one or two layers of cells, elongated parallel to the length of the seed. They contain gluten. Inside these cells and forming the greater part of the seed are large, polygonal cells filled with very minute starch grains. Compared with wheat the Nitrogenous percentage is 7 to 22 in wheat, 14 in oats, 12 in maize. The Potash in Rice is 8 %, as against 23 in wheat. Rice may be looked upon as a farinaceous food that requires to be mixed with fatty and Nitrogenous substances, such as greaves, milk, fat, gravy, blood, etc. It is used in the dry state in Dry Chick mixtures, usually broken, and it is also used largely for fattening ducks, mixed with greaves or other fatty substances

——**WHEAT.** This grain consists of a mass of albumen cells filled with starch, surrounded by a layer of square cells containing gluten, which in turn are surrounded by two or three layers of cells forming the ovary tissue, the final and outer covering consisting of epidermal cells, which complete the ovoid berry or seed. Without doubt more wheat is given to poultry than any other grain. It has the advantage of a minimum of husk, and its disadvantages are (in the entire grain), a deficiency in fats and albuminoids. Oatmeal is superior to wheat, in this respect, as a food, the ratios being: wheat below 1·6, and oatmeal 1·4⅓.

The analysis of wheat is as follows: Albuminoids 12·0 %, Fats and Oils 1·8, Carbohydrates 70·1, Mineral Matters 1·8, Husk 2·3, Water 12·0. Wheat is used in many forms as a poultry food, the chief poultry meals being principally derived from it. When ground wheat is sifted the following bye-products are found: 1st. Fine sharps, boxings or middlings, which contains a great deal of phosphate of lime and gluten; the latter being a flesh former. 2nd. Coarse sharps or middlings, etc., which contains materials similar to those found in the fine sharps or middlings, but not in the same proportions; there is less flour and less phosphate of lime. 3rd. Fine pollard, which has still a little lime, some cellulose, contained in the husk, but in the main is composed of gluten and silica or flint. 4th. Coarse pollard or bran, and 5th still coarser pollard or bran. Now, all these meals and brans are used more or less for poultry food; but they vary greatly in value. The great point is to choose the most nutritive samples, and where a bran is used, care must be taken to thoroughly scald it before use, drying it off with softer meals, such as middlings or sharps.

——**QUANTITIES.** All grains such as barley, wheat, oats, peas, etc., which are stricken with a stick having an even surface from end to end, are measured by what is known as "dry" measure. It is as follows:—

4 Gills	make	1 Pint.
2 Pints	,,	1 Quart.
4 Quarts	,,	1 Gallon.
2 Gallons	,,	1 Peck.
4 Pecks	,,	1 Bushel.
8 Bushels	,,	1 Quarter.
2 Bushels	,,	1 Strike.
4 Bushels	,,	1 Coomb.
2 Coombs	,,	1 Quarter.
36 Bushels	,,	1 Chaldron.
5 Quarters	,,	1 Way or Load.
2 Ways	,,	1 Last.

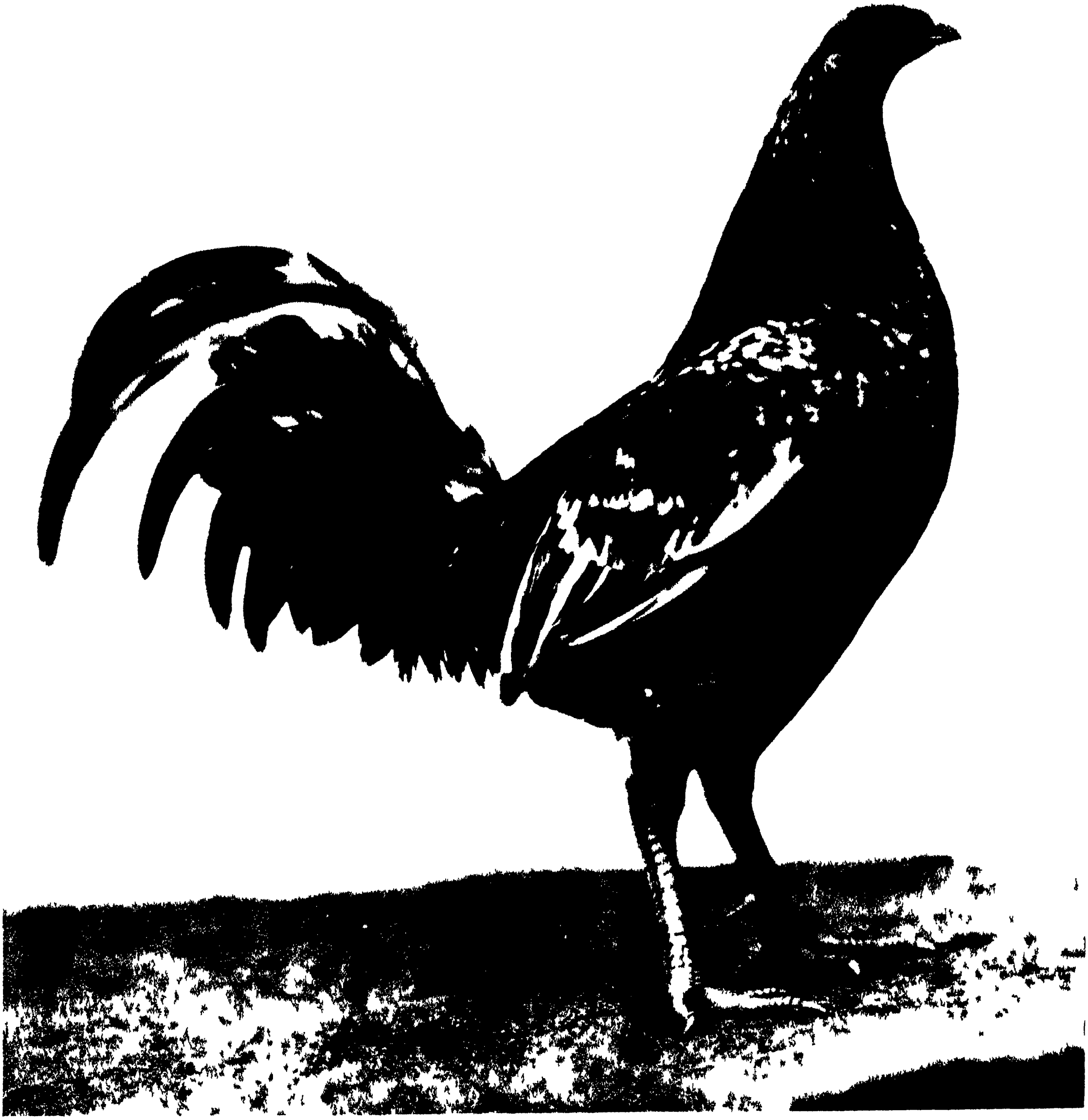
Meals, flour, etc., are sold by the peck or stone. At market the meals are usually sold in lots of 336 lbs. in London. Here is the table applying to the sale of Meals.

16 Drams	make	1 oz.	(oz.)
16 Ounces	„	1 lb.	(lb.)
14 Pounds	„	1 Stone.	
28 Pounds	„	1 Quarter	(qr.)
4 Quarters	„	1 Hundred weight.	(cwt)
20 cwts.	„	1 Ton.	

Rice (East India), is sold by the bag of about 1½ cwt. American by the cask of about 6 cwt. It is not wise to buy foodstuffs in small quantities. It is far better to buy at least in the quantities that each individual article is sold at on the market. Where grain, etc., can be obtained direct from the farmer it is the better way to buy it.

——**GREEN FOOD.** The value of green food can hardly be exaggerated; it is, indeed, a paramount necessity. Moreover, it is necessary that a certain proportion should be uncooked or "live," for the cooking partly destroys "the anti-scorbutic principle," which is contained in the live cells. Therefore, it is far better that green food be given in its natural uncooked state when possible. The kinds of green food that may be given are many. Of course, grass stands out first as the most natural, and the handiest of them all. All fowls love grass, and where they have a free range, not much green food need be given. Lettuce may be said to come next to grass, as besides being easily digested, it is highly nourishing. Cabbage is nearly always available and therefore is used largely for poultry. The analysis of cabbage is: Albuminoids 2·4, Fats and Oils 0·4, Carbohydrates 3·8, Husk or Fibre 1·5, Water 90·5. Now meadow grass has a higher analysis than that, *viz.*, Albuminoids 3·5, Fats and Oils 1·0, Carbohydrates 13·5, Mineral Matters 2·0, Husk or Fibre 4·7, and Water 75·3. It will be realized that good fresh, ever abundant, grass means much to a fowl; and that where a bird is kept in confinement, on small grass (soon fouled), or gravel runs, it is placed at a very great disadvantage as compared to a bird on a free range. It is absolutely dependant on its keeper for a supply of green food, and if it is not forthcoming, eggs will soon be few and far between.

PLATE No 41



Old English Spangle Game Cock.

(Bred and exhibited by Miss R B Babcock Rimington, Clitheroe)

Winner Cup and 1st Treharris Cup and 1st Lanelly 1st Birkenhead 1st Ripon, etc

Red clover has a still higher nutritive ratio than that of meadow grass, its analysis being as follows: Albuminoids 5·0, Fats and Oils 0·8, Carbohydrates 13·3, Mineral Matters 2·4, Husks and Fibre 6·5, and Water 72·0. Clover is now used for fowls largely in the dried state. Dandelion is a fine food for fowls, and young nettles, boiled and mixed with the soft food are also good. Swedes, turnips, mangolds, parsnips, carrots, onions and beetroot are all good for fowls, some are best boiled, while others may be given raw, sliced, or chopped up. For instance, onions, when young can be cut up and placed in troughs, while beetroot and parsnips are better boiled, and then mashed up with the soft food. It will be well to note the analysis of the principal roots just mentioned, so that where a choice is possible the most nutritious can be chosen. The analyses are as follows:

	Alb.	Fats.	Carb. H.
Swedes	1·3	·1	10·6
Turnips	1·1	·1	6·1
Mangolds	1·1	·1	10·0
Onions	1·3	0·2	4·8

In the country all the above-named roots and vegetables can be either grown or procured easily, while in town an arrangement can be made with the greengrocer for a regular supply of any suitable green food, or vegetable waste that he may have left over. In vacant runs and spare bits of garden rape seed may be sown, and fowls are very fond of the green food so produced. Nothing has been found to check feather eating so much as a good, regular, supply of green food and vegetables, which by cooling the blood seem to check the vice, especially if occupation and exercise be given at one and the same time by suspending the green stuff, cabbages, etc., at such a height that the birds have to jump to get at it. Where cut clover in the dried state is used, it must be cut into short lengths, then steamed or soaked in boiling water all night, and finally mixed with the soft food. Clover contains an enormous amount of lime, no less than 30 in each 1,000 lbs. by weight. It will at once be seen that such food is grand stuff for egg production.

It has been definitely proved that birds lay more if given green food, when in confinement, than when not given it, and this fact should be borne in mind. Potatoes although very starchy in composition, are useful as a poultry food. But as they are practicallly devoid of fats or oils, care must be taken to use them mixed with meals that will supply this deficiency, such as ground oats, maize meal, toppings, etc., When suspending cabbages for birds to peck at, it is advisable to split them in half first, otherwise the rougher kinds are difficult to disintegrate. For chickens green food is better if cut up, and given in troughs. Grass may be given in this way, in troughs, where there is no grass run; and the little ones are not liable to get crop bound, as is the case where they are able to get at long stringy grass. Lewis Wright advises where space does not allow of a really open grass run for chickens, but is not too much confined for grass growing, the following plan to be followed: Take two or three frames of 2 by 3 in. quartering, 2 feet wide and three or four feet long, and covered one side with inch mesh wire netting. The ground being first prepared is sown with suitable grass, and clover seed, and covered with these frames, the netting uppermost, and thus raised two inches above the ground. All is thus fenced away from the chickens until the grass and clover under one frame is sufficiently grown, when they are allowed access to it, and pick at the green food through the netting, but cannot trample it down or scratch it up, and foul it much less than if allowed to walk over it. When they have fed down one frame it is fenced off, and another left open, then the third, and the rest in turn, if more in number. By this time the first frame will have made fresh growth, and in this way much real help may be obtained. Another plan is to fence off six inch strips of ground with perpendicular wires one and half inches apart, which thus allow the chickens to pluck the grass, without being able to walk upon it or contaminate it.

FENCING (*see* "Accommodation.")

FERTILE. Applied to an egg with an impregnated germ or embryo chicken; if held up to a light in a dark room the embryo will be seen as a dark spot within. (*See* "Egg Testing.")

FERTILITY AND SEXUAL INFLUENCE. The general opinion is that the male bird fertilizes only one egg at a time, which accounts for the fact that fertile and infertile eggs occur irregularly in every batch of eggs. It is a little difficult to determine how soon the eggs will be fertile after the male bird has been introduced, as there are several circumstances to be taken into consideration, but as a general rule it will be safe to allow three weeks to elapse, though there are cases where birds do not settle down together for some little time. To ensure fertility several ordinary precautions have to be taken, but even when everything has been done circumstances may arise to upset the best-laid plans. The great thing, however, is to select vigorous and healthy stock on both sides. In the early portion of the season a well-developed cockerel is generally more likely to fertilize eggs than an old cock, because the vigour of the latter has but recently been sapped by the trying ordeal of the moult, and some time must elapse before he regains suitable condition for breeding. There is a similar objection to a late-hatched and undeveloped cockerel, which, though he may actually fertilize eggs, will throw weakly germs and chickens, so that it is important to choose a bird that is well grown and vigorous. But fertility does not rest entirely with the male, and failures may result similarly through old hens not being properly recovered from the moult or pullets being undeveloped. We have known cases where females have in the early part of the season been very shy of the cock, and this can only be attributed to lack of condition for breeding.

Infertility is, therefore, due in many cases to the unsuitable condition of the stock, and in such instances time alone will bring about an improvement. It invariably happens that the percentage of fertility is higher among stock that are running at liberty or have a good-sized grass run than among those which are kept in close confinement, and one can generally more safely allow one or two more hens to the cock when the birds are at liberty. The proportion of males to females must, however, depend upon the time of year and upon the class of birds. Among such heavy breeds as Orpingtons, Plymouth Rocks and the old Brahmas and Cochins, three or four hens are sufficient during winter when breeding commences; but the number can safely be increased to half a dozen later on in the spring. Among the Wyandottes we should allow one more hen in winter and two more in spring, and among the lighter active breeds, such as Leghorns, it would be safe to run seven or eight hens in the early part of the season and up to a dozen later on. These figures are approximate, for we must also take into consideration the age and condition of the stock. It is not good policy to run two cocks in one flock at the same time, as they generally fight and one becomes mastered by the other and is prevented from being useful, though two cocks may be used alternately, one one day and the other the next. The strongest germs and finest chickens are generally thrown by two-year-old stock when in good condition, though excellent results are obtained by mating a well-developed cockerel with two-year-old hens.

There are numerous causes of infertility, but most of them are affected by the condition of the stock. A cock may have too many hens running with him, or he may have too few, for a vigorous cock may do harm to hens if he is too attentive, and when hens are seen to be losing feathers on the cushion it is a sign that the male requires more mates. Cold weather may affect the vigour of the stock, and among the large-combed breeds especially frost may temporarily ruin a cock for breeding. Then again, hens of the large-combed and crested breeds are rendered shy through defective vision, so that chipping of the crests and dubbing of the combs is frequently resorted to in the breeding pen. Too generous feeding is apt to make birds lazy; but it will be seen that practically everything depends upon condition, and when that is right good results may be anticipated. Breeders should, however, keep one or two stock cocks in reserve so that if a bird is seen to be inactive a change can be made. A vigorous stock getter is invariably a good-mannered bird that calls his hens up to feed and has plenty to say for himself. A greedy, sulky cock should be watched carefully to see whether he is active.

The duration of the male bird's influence varies according to circumstances, for we have on occasions found eggs infertile a week after the cock was removed, and at other times fertile eggs have been set about three weeks afterwards. The more vigorous the cock and the fewer his mates the longer his influence will endure. Sexual influence is a matter of great interest and importance, and experiments have shown that to a certain extent the sex of chickens can be influenced by the mating of the parents. Thus, for instance if in the early part of the season a vigorous, well-developed cockerel is mated with about four hens there would likely be a preponderance of cockerels, but as the season advances or more females are added to the pen the balance will be restored. Similarly, if an adult cock is mated with five or six pullets, females will predominate in the offspring, but as the season advances and the cock gains in vigour and condition the difference will not be so marked, while if the same cock is mated with only three or four pullets there is more likely to be an excess of cockerels. It is impossible to predict the result when birds of the same age are mated together, but generally cockerels are more numerous from a small pen of females headed by a vigorous male. The accepted principle is that the sex of the progeny is largely influenced by the vigor and condition of the parent stock.

It may be added that the purity of a bird's produce is not affected by the fact that it has at some period been running with fowls of another breed, though in the case of hens, sufficient time must elapse to allow the influence of the foreign male to pass away before eggs should be set for hatching pure chickens. This influence may last three or four weeks, for there is no general rule applicable in such cases, and one can only be upon the safe side by allowing a generous margin.

FIFTH TOE DOMINANT (*see* "Heredity.")

FLEAS (*see* "Parasites.")

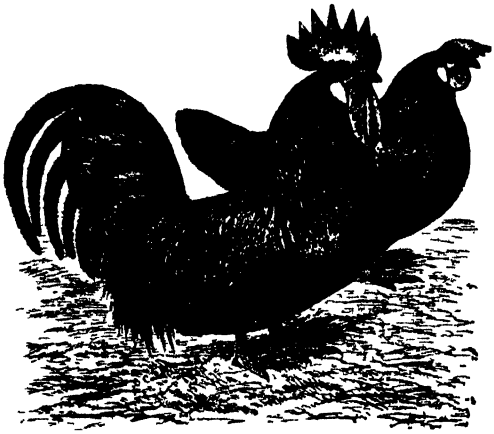
FLIGHTS. The strong wing feathers used in flying.

FLOORS (*see* "Houses.")

FLUFF. The mass of soft feathers below the tail and about the thighs, chiefly developed in Brahmas and Cochins.

FOREIGN BREEDS, LESSER-KNOWN. There are more than fifty distinct races of foreign breeds, some of which, however, are so well-known in this country that they cannot rightly be termed "lesser-known." Such, for instance, are the La Bresse, the La Flèche, and the Faverolles of France; the Minorca of Spain; the Leghorn of Italy; and the

Campine of Belgium. In the following remarks we have briefly touched upon a few, and only a few, of the lesser-known foreign varieties. We are indebted to "The Races of Domestic Poultry," by Edward Brown, F.L.S., for many of the following particulars (*see also* " French Breeds.")



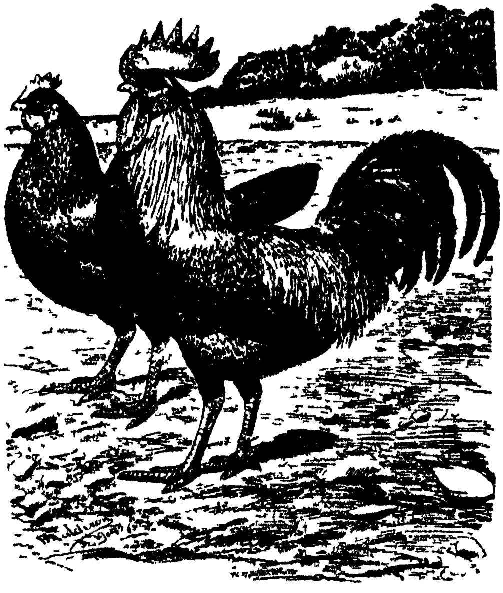
The Courtes Pattes.

——**VOLDARNO.** This is an Italian breed, belonging to the laying or non-sitting class. There are two varieties, the Black and the White, which are exactly similar save for the colour of plumage, and the colour of the legs and feet, the Blacks possessing shanks that are grey, while those of the White are yellow. The birds are quite small, extremely hardy, and the hens are stated to be very prolific. In shape and general appearance they closely resemble the Leghorn.

——**CASTILIAN.** The differences between the Minorca and the Castilian are very slight, both being of Spanish origin, non-layers, of similar shape and economic qualities. The chief variety is the Black, but Whites and Blues are frequently met with. The weight of an adult male is about 6 to 7 lbs., that of a hen 5 to 6 lbs. The hens are excellent layers of large white eggs, and while the chickens are hardy, they are somewhat slow in growth. In many parts of Spain the Castilian is very extensively bred, and as an egg producer stands in the first rank.

——**PRAT.** A Spanish general-purpose breed of undoubtedly good economic qualities. The hens are good layers of pinkish-white eggs, reliable sitters and mothers, and the table properties are quite satisfactory. The adult cock weighs about 6½ to 9 lbs., and the hen 5½ to 7½ lbs.

——**ARDENNES.** This breed is called after the district in which it is mostly found, in the Ardennes country in the South of Belgium. There is but one variety, the plumage resembling that of a Black-red Game. It is of the general purpose class, its flesh is white, and it produces eggs of a similar colour. It is a wild race of fowls, and cannot stand confinement at all well. The hens are fairly good layers, extremely hardy, and they look after their chickens well. The weight of the cock is from 5 to 6½ lbs., that of the hen 4 to 5 lbs.



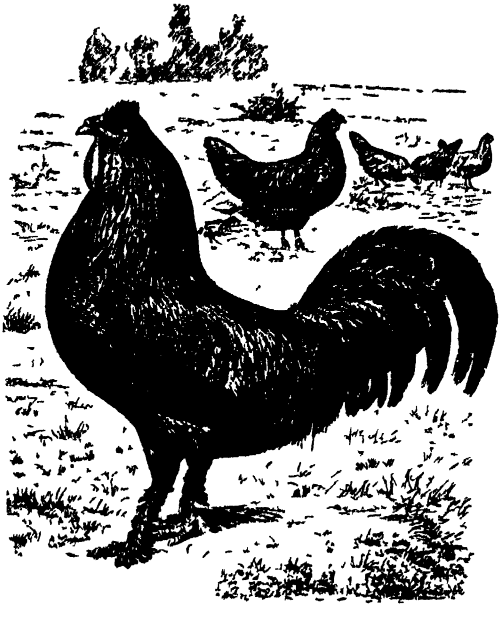
The Ardennes.

——**HERVÉ.** Also a Belgium breed, called after the Hervé country in the province of Limbourg. It is a non-sitter, producing a large number of small-sized white-shelled eggs. There are three varieties, the Black, Blue and Cuckoo. The chickens are very hardy indeed, and thrive well in the most unsuitable places, and amid the least favourable surroundings. The chickens of this breed are very largely used as milk chickens, *poulets de lait*, and are extremely suitable for the purpose. The Hervé is a very small bird, the adult cock weighing no more than 3 to 4½ lbs., while the females are rarely above 3 lbs.

The Castilian.

——**BREDA.** There are four varieties of the Breda, a Dutch fowl bred very largely in many parts of Holland, the Coucou, Black, Blue and White. It is a general purpose variety, fairly large in size, the males being 6½ to 9 lbs., while the hens are about 1½ lbs. less, and it is of an extremely hardy constitution The hens lay large eggs, but while they belong to the general-purpose class, they rarely evince any desire to sit. The chickens grow rather slowly, and take a considerable time to obtain their full covering of feathers. The meat is of excellent quality and colour, and the birds lend themselves very readily to fattening.

——**RAMELSLOK.** A German breed of the non-sitting type, of which there are three varieties, the White, Black and Speckled. M. Vander Snickt, of Belgium, claims the white variety to be a White Braekel, but we cannot enter into this subject here. Certainly the two breeds resemble one another very closely indeed. The hens are excellent layers, producing large, white-shelled eggs; the chickens grow quickly, and are very suitable as milk chickens, but the flesh soon becomes tough and stringy. The male averages 5 to 6½ lbs. in weight, the hens about 1½ lbs. less.



The Breda.

——**ORLOFF.** The Orloff is a Russian

breed, belonging to the table class, and is divided into three varieties, the Red, Speckled, and White. A pen of Orloffs was introduced into this country a few years ago, but did not thrive at all well. The hens are poor layers, but the edible qualities are good. The breast, which is extremely well developed, is covered with a remarkably large amount of meat. Their chief value seems to be for crossing with other breeds, as the Old English or Indian Games, in order to improve their table properties. They are large birds, the adult cock weighing about 9 or 10 lbs., and the hen a couple of pounds less.

——**MAGYAR.** A non-sitting breed found in Hungary, which possesses some very valuable qualities. It is as an egg producer that it chiefly appeals to the utilitarian, and records show that it averages about 150 eggs per annum, which number could be increased by selection. The eggs are rather small and white in colour. They are very hardy and splendid foragers. The cock weighs from 4 to 5 lbs., and the hen about half-a-pound less.

FOSTER MOTHERS (*see* "Rearing, artificial.")

FOUL LAND, TO CLEAN (*see* "Accommodation.")

FOXES (*see* "Enemies of fowls.")

FRACTURED BONES (*see* "Accidents.")

FRENCH BREEDS. The chief characteristics of all the French breeds of poultry are their utility qualities, both as regards layers of large quantities of eggs and suitable table birds, possessing delicate and juicy flesh of a white colour. The average size of most of the French varieties is considerably less than British breeds of poultry, and even those French varieties that are bred in this country are far larger than the French specimens of the same variety. In France the white-legged, the black and white mottled-legged and the black-legged varieties of poultry are by a long way more the favourites for market (in the order given) than any of the yellow-legged varieties. In Great Britain a brown-shelled egg is thought a good deal more of and fetches a higher price than a white-shelled egg, but in France it is the reverse —a white-shelled egg being the most desired—and thus it is that most of the popular French breeds of fowls lay white-shelled eggs.

——**BARBEZIEUX.** A clean-legged black fowl, with single combs and white ear lobes; they are similar in every way to the Black Minorca.

——**BOURBONNAIS.** A single combed, slightly-built bird; plumage in both sexes white, with the exception of the neck hackle, flights and tail; the feathers of the neck hackle have a black stripe down the centre and the tail is black; flights black; beak, legs and feet white.

——**BOURBOURG.** This is a useful looking variety. In shape and size they are rather like a Sussex Fowl, and are marked similarly to the Light Sussex, having a white plumage, with black striped hackles and black tails. They are also slightly feathered on the legs.

——**LA BRESSE.** There are three varieties of Bresse fowls, *viz.:* The Black, the White and the Pencilled. They have single combs and white ear lobes; in shape they are similar to a small Campine. The Pencilled hen is very like a Silver Campine in colour and markings, as well as shape, but the Pencilled cock is a white bird with a black tail. They are generally considered fairly good layers, but the eggs are small.

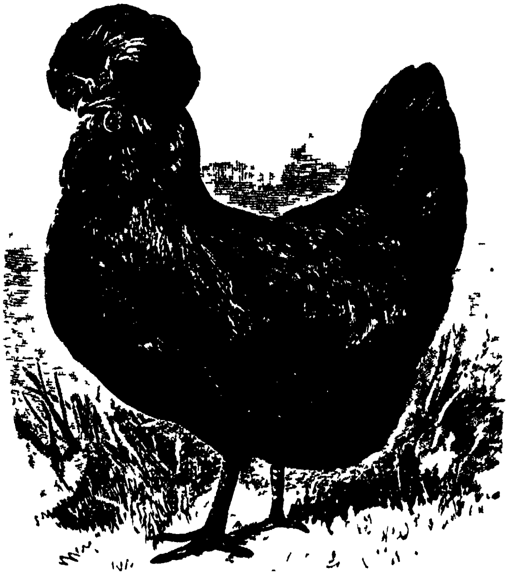
——**CAUMONT.** This variety is considered a good utility one. The birds have black plumage and are similar in size and shape to good Black Minorcas, but differ in head; they have white ear lobes, long wattles of a bright red colour. The comb is quite different from any other breed of fowls, and reminds one of the antlers of a reindeer. The cock has some flowing feathers on head resembling a kind of crest, which is more crest-like and decided in the hen.

La Flèche.

——**COUCOU DE RENNES.** These birds are large and bulky, very like a Plymouth Rock in shape, with Cuckoo or barred feathers, similar to a Barred Plymouth Rock. They, however, differ from the Plymouth Rocks in having white beaks, legs and feet.

——**COURTES-PATTES.** This is rather an old variety. They are a long-bodied, short-legged fowl, somewhat resembling a Scotch Dumpie, but finer in bone. Combs should be single and evenly serrated; medium sized wattles; almond-shaped ear lobes, which are white; plumage black, with a green sheen; fairly long tails in both sexes, the cock having good flowing sickles. It is a variety pre-eminently suited for table purposes, possessing white flesh. The hens are fairly good layers, and they sit well; the chickens are hardy, and under favourable conditions develop rapidly. The average weight of an adult cock is no more than about 3½ to 4 lbs.: that of the female about a pound less.

——**CRÈVE-CŒUR.** A useful and pretty variety, but not a very popular one in this country, owing, no doubt, to the difficulty in rearing the chickens, which are generally very delicate, although some strains are far stronger than others—for instance, we have seen some very good typical specimens, large and strong, which were hatched and reared amongst the hills of Scotland. Both sexes should be of a deep black plumage throughout, with a beetle green sheen, the more lustrous the better; the crest, whiskers and beard should be large and full and compact in shape. The combs of Crève-cœurs are quite a characteristic of the bird; they should be like a pair of horns and of V shape. Beak black or horn-



Crève-Cœur.

coloured; legs and feet black; four toes well spread (in this point they differ from the Houdans, which have five toes). They are considered good layers and make good table birds. Birds of this variety bred in England are far larger than those bred in France.

——**FAVEROLLES.** (*See* special article).

——**GATÉNAIS.** A variety which is becoming very popular in some parts of France, and claimed to be exceptionally good utility birds. In shape they somewhat resemble a Plymouth Rock, but slighter in build. The plumage throughout, in both sexes, should be a pure, snowy white, with white beak, legs and feet; single upright combs, not large, but evenly serrated; comb, wattles, face and ear lobes a bright red.

A Breeding Pen of De Mantes Fowls.

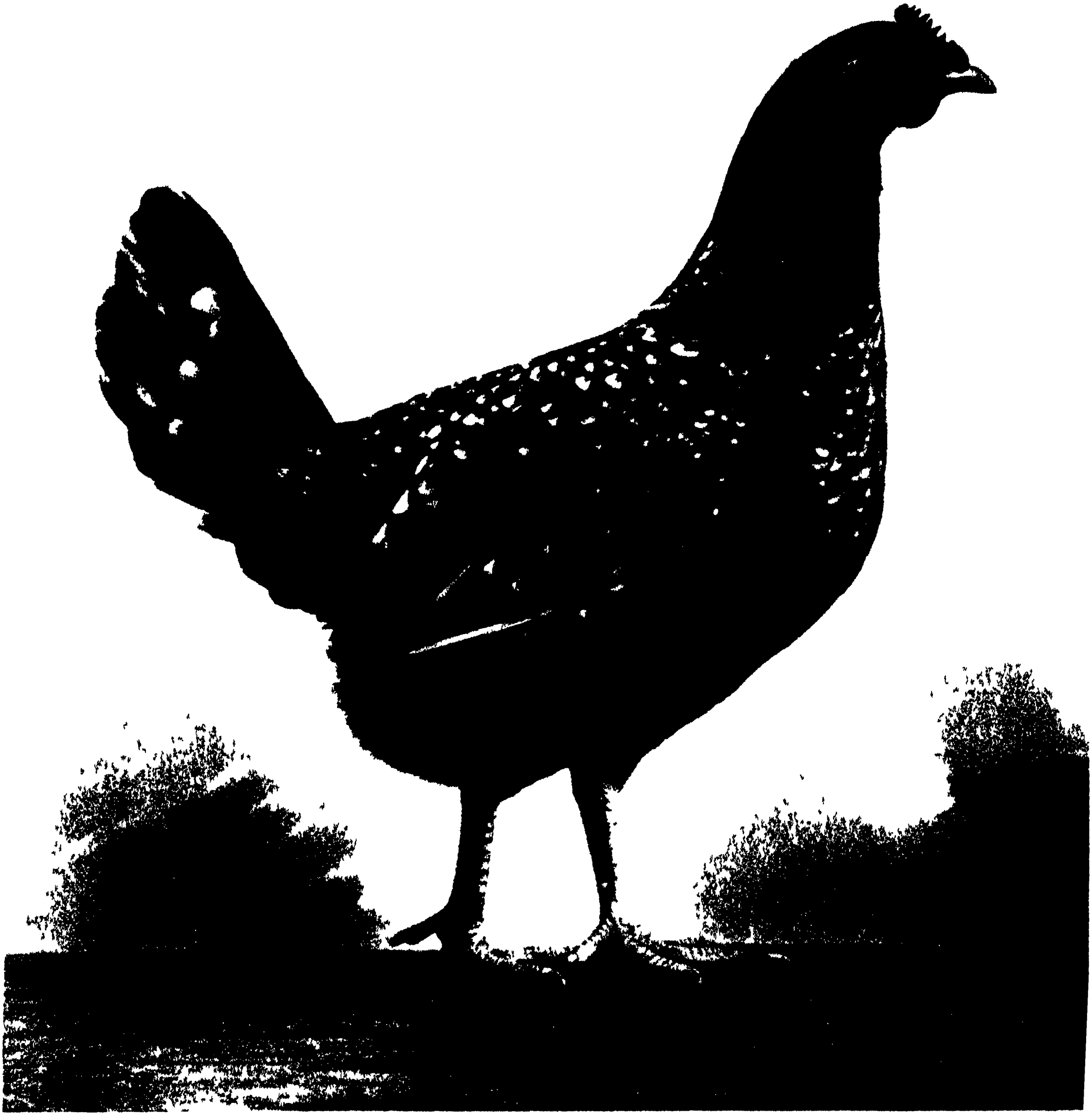
——**HOUDAN.** (*See* special article).

——**LA FLÈCHE.** Are tall, stylish and big-bodied birds. A good, useful variety, making excellent table birds, having fine quality flesh of a delicate flavour. With the exception of the comb, they are very like a large, well-developed Black Minorca. The comb should be horn-shaped, something like the comb of a Crève-cœur, but more spread. They should not have any signs of crest, whiskers or beard; wattles long, and face free from any white, which, with the comb and wattles, should be a bright red colour; the ear lobes should be almond shaped, fairly large, of a smooth and fine texture and pure white; beak, horn colour; legs and feet, black, with four toes; the plumage should be a deep black, with a brilliant green lustre; and the birds should have a bold, upright and smart carriage.

——**DU MANS.** This variety is practically a Rosecomb Black Minorca. They should resemble a good Black Minorca in every way but comb, which should be a rose comb, well worked on top, free from hollowness in centre and fitting close to the head.

——**DE MANTES.** Are an excellent variety and much valued in France—being first-class birds for the table and very good layers. They are larger than a good many French varieties; have black and white mottled plumage, similar to that of the

PLATE No. 42



Old English Spangled Game Hen.

(*The property of Mr. Harold Porritt, Netherwood, Grange-over-Sands.*)

Winner of 1st and Cup Blackpool 1st Ferndale etc.

Houdan. They have single combs, with whiskers and beard, but no crest; white beaks and legs, with four toes.

FRESH BLOOD (*see* "Breeding.")

FRIZZLED. Applied to a plumage in which each feather is naturally curled outwards, giving the bird a ruffled appearance.

FRIZZLE. This is quite one of the curiosities of fancy poultry and has a most peculiar appearance, almost all its feathers being curled in the opposite direction to those of other breeds, which naturally follow the lines of the shape of the bird, while in the Frizzle they curve away from the body and in the direction of the head, giving the bird the look of having had its plumage brushed up the wrong way, even to the feathers on the wings. Although possessing a very quaint appearance Frizzles are by no means pretty, which, no doubt, has a great deal to do with their unpopularity; it is only now and then that one meets a specimen of this variety at our shows. It is considered a very fair bird, as regards utility points, being of a medium size, with good quality of white flesh and, as a rule, is a good layer of fair sized eggs. There are different varieties, as regards colour, but the most common are the Whites and Blacks. They should have a neat comb (either single or rose) and wattles, which, with the face, should be a bright red; the ear lobes should be small and neat, having a white kid-like surface. In breeding for exhibition the chief point is to produce birds having every feather evenly curled, with the more curl in the feather the better.

FROST-BITE (*see* "Combs, diseases of.")

FURNISHED. When a young bird has attained the full characteristics of its species.

GALLUS (*see* "Origin.")

GAME FOWL. Game fowls are, and have been for centuries, one of our most popular races of domesticated poultry. More has been got out of game fowls than out of any other breed. They have provided sport for thousands in the past, and are still providing sport in the North for those few enthusiasts who maintain that there is nothing cruel in the pastime of "cocking." Be that as it may, the fact that occasional mains are fought proves that one old sport at least is dying hard, and that all the old blood is not yet extinct. But apart from the sportive side of game fowls, they have provided the fancier with the materials with which to try his skill in breeding for fancy points, such as colour, type, carriage, and so on.

Game fowls are divided into two classes, namely Old English and Modern. Both classes are composed of many varieties, and each variety is named according to the colour of its plumage. Modern Game fowls owe their origin more or less to the old warriors of the cock-pit; and are characterized by their stilty legs, long snake-like necks and heads, and shortness and fineness of feather. Not many years ago Modern Game fowls led the fashion in "fancy" circles, and fabulous prices were paid for good specimens. They were in the majority at the leading shows, fifty or sixty specimens generally turning up to compete in a single class. So strong a hold had these modernized birds on the "Fancy," that the original breed lived only in tales of the past, or in the yards of a few Northerners. In this more practical age of poultry culture the modern type of game, like most types of fowls devoid of economic utility qualities, fails to do more than barely exist. The up-to-date fancier saw not only beauty in the Old English type of fowl, but utility qualities of a very high order, and so the ancient breed had a revival, and classes were formed for the several varieties at the shows, with the result that to-day the breed is numerically stronger than ever before.

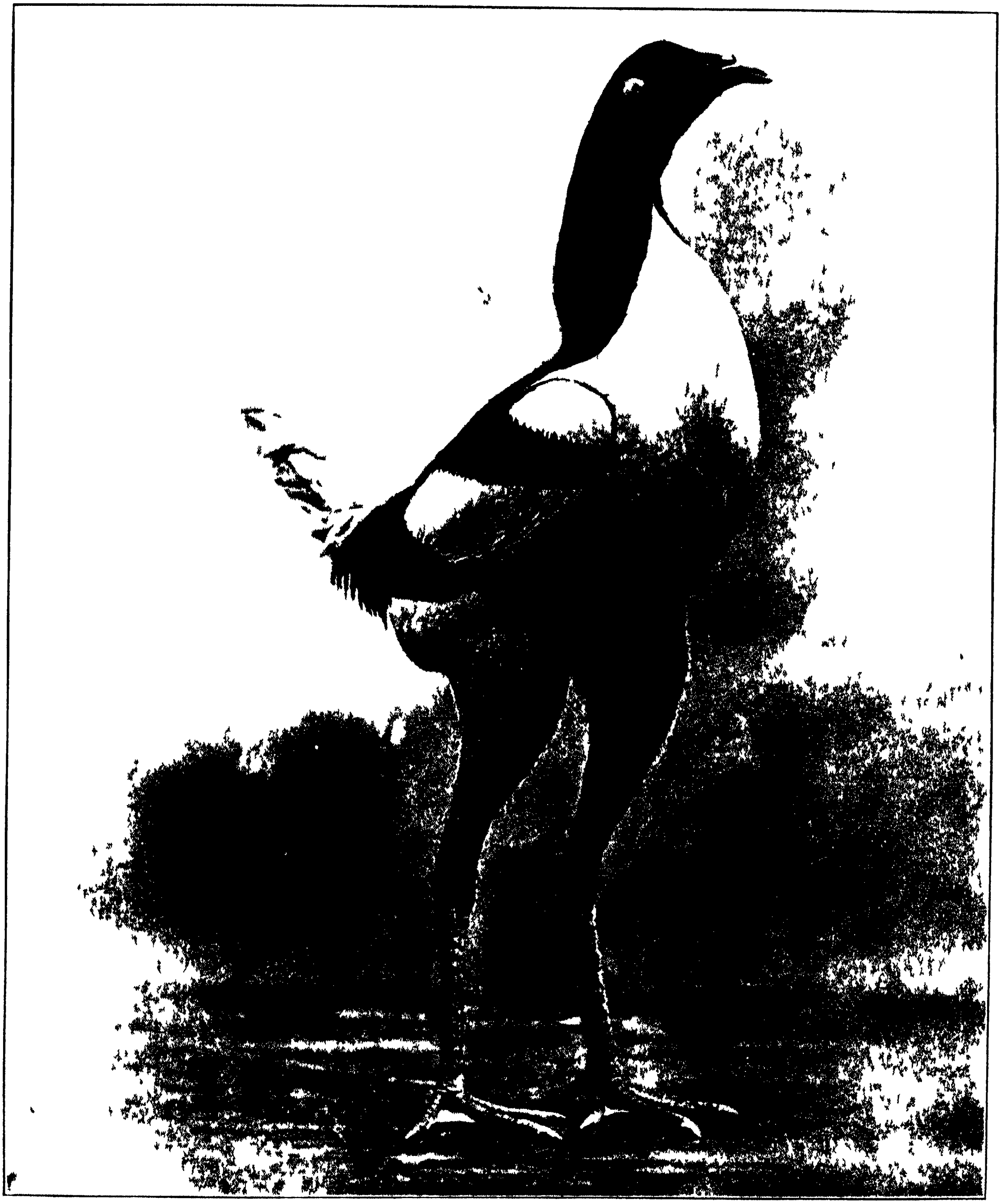
The one great virtue of the Old English game fowl lies in the fact that breeding for fancy points has added to rather than robbed it of useful qualities. Fanciers aim for fullness of breast, fineness of bone and whiteness of shank; three points also appreciated by breeders of ideal table fowls, and these three points enable the breeder of exhibition specimens to easily dispose of all his surplùs stock in the way of mis-marked birds to those who specialize in fowls for the table. As long as game fowls, that is Old English game fowls, have a hold on the fancy side of poultry culture, so long will the utilitarian have a reliable source whence to draw material for the production of high-grade birds for the spit.

Viewed from an artistic point, game fowls are unsurpassed or even unequalled. The numerous varieties offer a wide field for those whose operations lie in the direction of breeding for colour. Pen fails to adequately describe the beauties of many varieties of the Game family now bred for exhibition purposes. The male birds, like most males of the poultry-yard, surpass the females in beauty of plumage, coupled with which is that warrior-like gait and defiant air characteristic of their race. From their lusty throats they fling out challenges to their jealous rivals who, should they stray too near the confines of their harems, are speedily put to flight.

Game fowls lay white-shelled eggs, which, though somewhat below the average in size, are unequalled for fullness of meat and richness of flavour. The Old English game hen is a splendid sitter and mother, and woe betide the cat or rat that dares to approach her brood. She has been known to fight to the death for her downy charges, but more often than not she proves victorious. The only drawback to the game hen as a sitter and mother, lies in the fact that she cannot be used with safety in the colder seasons of the year, owing to her insufficiency of feather; in mild seasons, however, she is unequalled as a sitter, mother and guardian. The game fowl is a perfect combination of the useful and beautiful in bird life. It has had a long and varied career. It has done battle for our forefathers, and has survived the trials of the cock-pit to enter on a more glorious mission in the show-pen, and to impart pleasure to those who sport with it in a more dignified manner. It has played the rôle of ally in the making of sub-varieties and other distinct breeds. It has added economic qualities to many recognised table breeds. In short, it has played a wonderful part in the making of poultry-yard history, and is still playing a leading part before thousands on the stage of poultrydom, where it is applauded as the grandest survivor of all the grand old breeds.

—— **OLD ENGLISH.** If there is one breed of fowls that belongs more to England than any other, it is the variety holding the above name. Of late years it has been seen most at the poultry shows throughout the country, but in times past it formed the leading sport for all the nobles of the land, and its origin is lost in antiquity. To go back to the time of Cæsar, we learn that the Britons kept fowls for pleasure and diversion, and although we are not told in exactly what direction this lay, no doubt it referred to that of cock fighting. Through all succeeding ages cock fighting has been one of the leading sports of the aristocracy, being too expensive for the common people to follow it at all closely. It is also a sport that was favoured in other countries. Often a battle was fought with the idea of imbuing even schoolboys with the spirit of courage, a method approved by such moralists as Socrates and Solon. The Romans followed the same example. To go back farther still,

PLATE No. 43

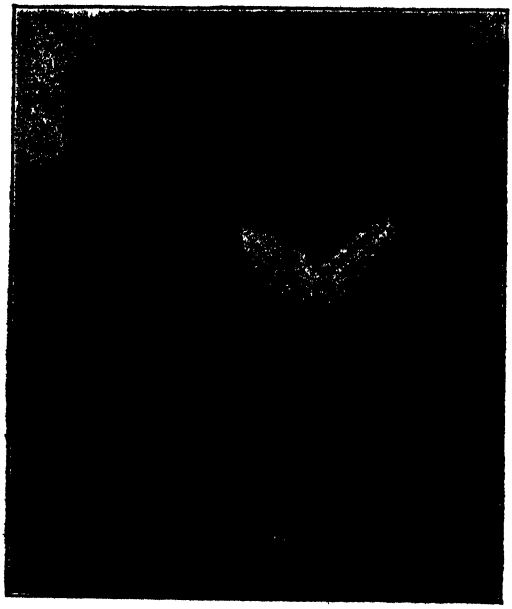


A Typical Modern Pile Game Cock.

some of the earliest Chinese records mention cock fighting, while in India there are notices of the same thing dating back at least 1,000 years B.C. The Persians and the Greeks both practised it for centuries. Somewhat cruel though it may appear, it has been practised by all ages and all peoples, from time immemorial. Some of the old books on sports described the methods of cock fighting, and went so far as to deal with the system of training and feeding. Even down to the middle of the nineteenth century there was in England a real and deliberate purpose of firing the youth of the country to a spirit of valour and endurance by the example of the courageous fighting cock. For many years it was always spoken of as the royal sport of cock fighting, for several of the crowned heads favoured the pastime and spent large sums of money in its support. The steel spur is no new thing, for we read of these having been used as far back as the seventeenth century. To such a height was this sport carried that amongst the noblemen invitations would be issued for week ends, when the guests would be entertained with cock fighting. Lewis Wright quotes a case in point. In the Easter week of 1822 in one pit 188 cocks were fought for sums amounting to upwards of £6,000, the average weight of the birds being 4 lbs. 3 oz.; and yet more recently still over 1,000 cocks have fallen in a single season in one of our northern towns. The amount put on the different birds and the high stakes are only equalled by the best of the horse races of to-day, often as much as £1,000 being put on a single battle. One of the strongest arguments in favour of inbreeding is that the fighting strains of cocks, owned by the leading men, had never been tampered with, and no attempt at any out cross had ever been used. The sole idea that came uppermost when breeding was a due regard for health and age. One of the most celebrated strains of the early part of the present century had not a cross for forty years, and yet they were seldom beaten, and not in the least degenerated. No doubt the type of these cocks varied a little from those we have to-day. In fact, we now have two or three different shapes, probably on account of two or three clubs, each of which has its own type of bird. One of these attempts to keep the bird as near as possible to the fighting type, and in a large measure it succeeds, for in all its shows, whenever they are exhibited, the birds are judged on fighting lines, *viz.*: the feel in the hand, and not on external appearance. Most of the birds to-day are heavier than the old fighting weight, but now in a few classes in the North of England the limit weight of the bird is given, and kept fairly low, so as to be near the old weight and size. The ordinary exhibition type of Old English Game is a bird of larger build, and one that carries more feather and is naturally a little softer. The standard of a proper fighting Game cock is a keen fiery eye, active disposition, and a fine hard, rich, glossy plumage. He must have a powerful beak, nicely curved; strong head, not too long; fair length of neck; show a good bold chest; flat back, a drop off towards the tail, sharp, in a wedge-like form; legs set well apart, with good hard bone and thighs; clean feet, small, but with a long back claw, which stands straight out, so as to prevent the bird falling over backward when struck by an opponent. The feather should be as hard as nails, and yet as fine as silk. If the condition of flesh is all right and the bird in good health, the plumage will look as if it had been groomed with some brilliantine and yet be free from any oily substance. In the pit, condition meant everything, while to-day in the show pen condition again counts for a great deal, hence it is useless to show any Game fowl when out of form. While to-day we have a few colours more prominent than others for the pen, such as the Spangle and the Black-Breasted Red, in the height of the fighting craze colour counted for little and a strain could be found of various colours which had done great deeds in the pit. To mention only a few of these there were: Piles, Light Reds, Dark Reds, Blacks, Greys, Duns, Duckwings, Smocks, Whites, Pied, Yellows, Red Piles, and Birchens, so that there was variety then as now. In the matter of breeding colour is not so important as strain and shape. Often after mating up one would find a pen made of a Spangle cock, Partridge, Wheaten and Spangle hens, or the same hens with a Black Red cock, and though the progeny varied, all would do for the show pen in one class or another. The Spangle is a very popular colour, the name very fitly describing the bird itself: a white tipping, as evenly as possible all over the body, both in hens and cocks, with no big splashes of white anywhere. Next to these come the Black-Breasted Reds, and though the first part may be correct, the latter part of the term is indefinite, as there are several shades of red. With these, however, a black breast, thighs and wing bars are essential, with the top colours the same as in the Modern Game of the same name. One of the most handsome of the family is the Brown-Breasted Red, so called because the breast is a dull black with a fine rich orange lacing down the throat and running into the breast. The hackle, shoulders and saddle are a rich dark orange, while the eye and legs must be black or very dark. The hen should be a black inclined to a bronze shading, with a slight orange tinge in the neck hackle, the head and legs matching the cock. Then we have the Gold and Silver Duckwings, though the former is sometimes called a Yellow, both very pretty and smart when bred of a good colour. The yellow must resemble the colour of the Golden Duckwing Modern Game, with the colour on the shoulder quite bright. The silver must be the same as the Silver Modern, or what is more common and easily understood, the Silver Grey Dorking, both in cocks and hens. Both these colours are bred very smart, with a neck and saddle hackle as fine as silk and very hard. When bred a good colour, they should stand an equal chance with any of the variety in the show pen. A very pretty colour is the Blue Red, or Blue Dun, these being the same in top colour as the Black Red, yet blue where the latter is black. If the blue is of a rich colour, it shows up the bright red of the shoulder, and with the red face and fiery eye they are very attractive. The hens are sometimes referred to as Blue Wheatens, though a few only show the colour in the tail. With these, as with any other colour, this is not so important as getting the shape and character of the breed. Among the colours seldom seen in the show pen, yet which always gave a good account of themselves in the pit, are the Piles. At the pure fighting Game shows some can be seen which contain the blood of the old warriors handed down. A few are clear breasted, while others show a splashed breast, and in regard to top colour some are very much darker than others. As to the colour itself, the standard of the Modern Game can be taken as a guide. Then there are the Black and White Selfs, and Brassy Wings, which are black with just a few golden feathers on the shoulders. These are very smart and immediately take the eye of any Game fancier. The Henny Game is another fowl classed under this heading, and is very much as the name implies. The cocks have a henny appearance, not showing nearly so much neck and saddle hackle as the earlier named varieties, in fact, the less they have of it the better. Their combative powers are very large and they needed less clipping for the battle. In one or two varieties there is the Whiskered Fowl, though these are but seldom seen and are in the hands of a few breeders. (*See Plates Nos.* 39 *to* 42 *inclusive*).

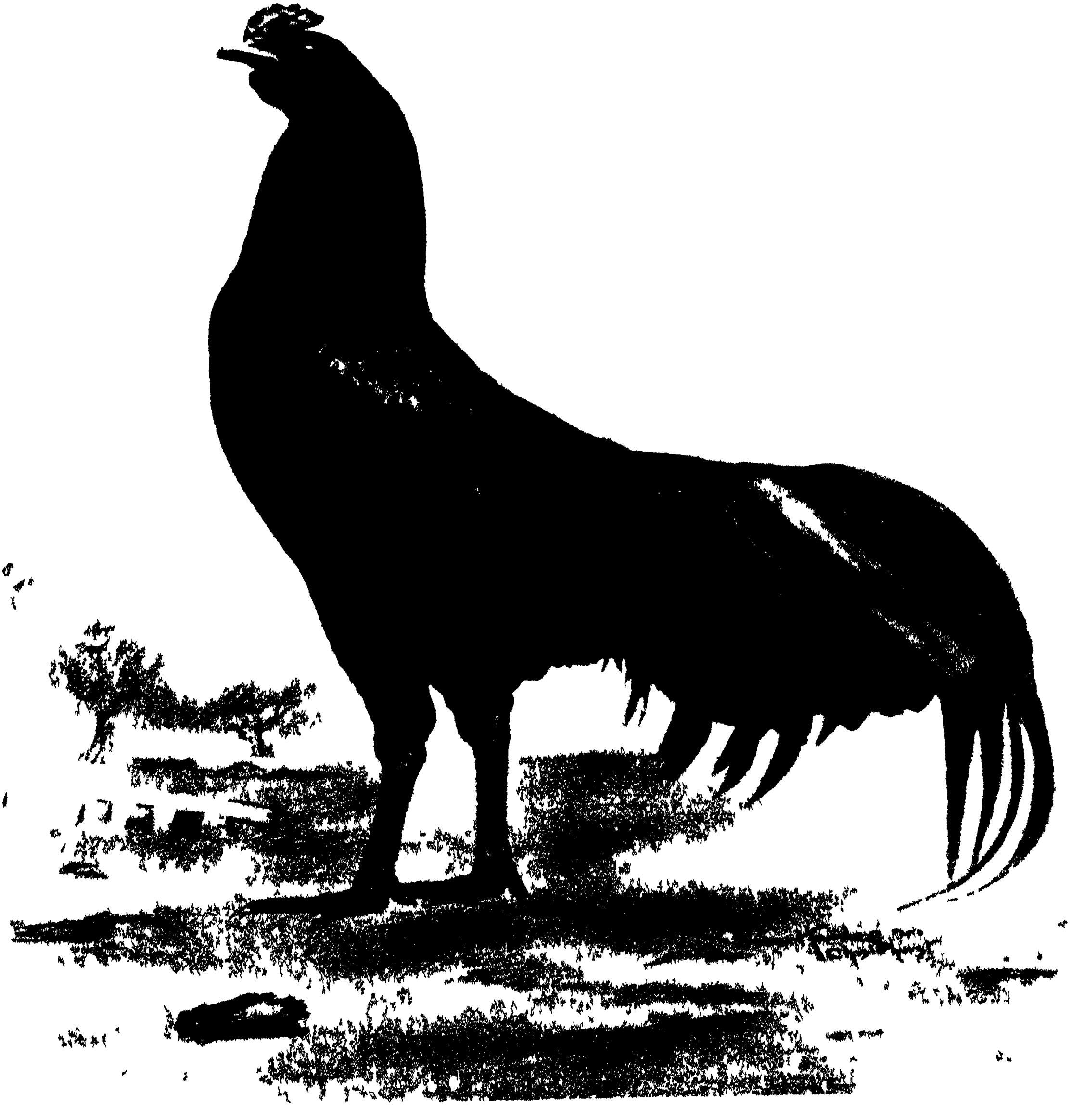
Modern Duckwing Game Cock.
The property of Mr W H Cook, St Paul's Cray, Kent.

——**MODERN.** The evolution of the Modern Game is one of great interest to all game fanciers, and even in some measure to those outside this circle. The present shape and style of the bird, in comparison to its ancestors, only shows what can be done by careful selection at the breeding time. Modern Game, as we know it, never was longer in leg, simply because although it has assumed the same name now for many years, the modernizing influence is still in the direction of greater length of leg. Although there are a few fanciers that cannot see beauty in a Modern Game fowl, there are others who stick very tenaciously to them and keep on breeding, though but few shows provide classes for them. When the bird first came to be recognised was at the period when there seemed a lull in the cock fighting world. Some of the old hands were dying out, and a certain amount of public feeling was against what was termed a cruel sport, and at the same time poultry shows were becoming popular. A few of the Old English Game were shown, but the judges of the day seemed to favour the long-legged ones, hence the origin of the development as we know it now. As far back as 1870 the drawings of the birds pointed to a longer leg, and singularly with this came a much tighter feathered bird, and not nearly so much carried as on the parent stock, the Old English Game. The neck of the bird gradually lengthened, and with a shorter, closer fitting neck hackle, very little saddle hackle, and a tight whipped tail, the general appearance altered completely from the original stock. During the past ten years the breed has seen many changes. If not in actual type, outside influences have varied. It is true that no single fowl has ever made so much money as a Modern Game cockerel, for it is within the period mentioned that the late Captain Heaton claimed one at the Birmingham show for £200. Such figures always give a fillip to any breed, and at this time they were in the height of their popularity. The great Midland show has for years been the Mecca of all game fanciers, and still is, although the variety has lost ground considerably and interest has waned with the decease of a few of the old noted breeders. Still those who know the points of the Modern Game, can see in them a beauty and fascination which calls forth an enthusiasm scarcely paralleled in any other breed. In shape and features the whole of the colours are the same, and though all may not be up to the standard of the Black Red, that is the type and character each one is breeding for. The cock must be built on the lines of a racehorse: plenty of quality and substance and big bone. With a long, lean head, giving a snaky appearance; bold eye of a bright red colour; clean face, vermillion hued; the comb cut off close to the head, which gives smartness, as dubbing is recognised in all Game and you have the proper head. The neck should be long, shoulders broad, back short and quite flat, with the wings carried well up and close to the body. The tail must be short, carried rather low, with short, fine-pointed sickles. The body should be well up off the ground, with long legs and a still longer thigh, which should be set wide on the shoulders, thus showing a good front, though any appearance of clumsy nature is not appreciated. There must be no sign of weakness, but the bird should stand straight up and move about easily. The shins must be round, any being flat in front are considered faulty, while there must be only four toes, the back one standing straight out from behind, and be close to the ground. The type of the hen must be similar, with the same length of neck and leg, a full chest, and yet very closely feathered, and as hard as possible. The tail should be short and very tightly carried, and the wing ends fit into the sides, so that the whole looks very clean and neat. A fault with many good hens is to carry too much feather underneath, between the thighs and the root of the tail, which detracts from the cleanly appearance that they should have. To remedy this must be the object of all breeders, and it will come with care in mating. As to the colours, there are not nearly so many as in the Old English. The principal colour is the Black Red, while others are the Brown Red, Duckwing, and Pile, with minor varieties that include the Birchen, White and a Silver Duckwing. The Duckwing mentioned above is a golden, and these, with the other three colours, are mostly seen at the classical shows. The Black-breasted Red cock should be a rich black on throat, breast, thighs, tail and wing bar; a rich orange red neck hackle; the back, wing bow and saddle a rich crimson; while the saddle hackle is of the same cast, although a shade lighter. A great fault is the presence of any ticking on the breast or thigh, and birds so marked are heavily penalized in the show pen. The hen must have a rich salmon breast, golden neck hackle, slightly striped with black, but running clear towards the top of the head. The back and wings must be a light Partridge colour, free from any ruddiness or shaftiness in the feather. Both sexes must have a sound willow green leg colour. To take the Pile next, the colour must be the same as in the Black Red, excepting that where the one is black the other must be white. The beak and legs must also be a rich orange yellow, the deeper the colour, the more it shows the bird off. The Duckwing (Golden) has all the parts blue black, as in the Black Red, but the cock's head is a creamy white, running rather paler towards the end; the back and saddle orange; the wing bar a clear white. The hen must have a salmon breast, but the head is silvery white, showing a little black striping in the neck hackle, while the body colour is a nice soft steel grey shade, free from any rusty shading. The thighs will run rather lighter in colour, and the legs a dull willow green. The Brown Red Game is quite of a different character, inasmuch as it shows a distinct lacing on the breast of both the male and female sexes. The



Modern Pile Game Hen.

PLATE No. 44



Black Sumatra Game Cockerel.

(*Bred by Mr J R Eaton of Norwich*)

ground colour must be black, but the throat and upper breast of each sex laced with a fine lemon lacing. The eye of each must be black, as is also the face and comb. In the cocks the head, neck hackle, back and saddle hackle and wing bow, a pure bright lemon, but the neck hackle will show a little black striping toward the end. The base of all feathers must be black, and the lacing on breast clear. Although black legs are required, these get a dark horn colour with age, which is allowed. Of the minor colours, the White is a self-colour and needs no description, but the Birchen is like the Brown Red except that it is a silvery white where the Brown Red is lemon, and the Silver Duckwing is silvery where its near relative is golden. (*See Plate No.* 43).

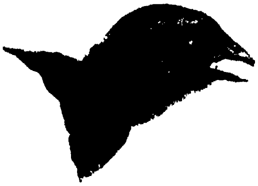
—— **HYDERABAD.** This variety of fowl is quite new to this country, a few having been imported quite recently. As might be supposed, they originate from the state in Central India, whose name they bear, and are also kept in Ceylon. However, they have a long history, are bred purely for fighting and the natives ask big prices for any of the stock. In shape and character they much resemble the Indian Game, are of a very pugnacious nature, and though much lighter in weight than the Old English Game, will fight quite as tenaciously and stand up while life lasts. The hens in this respect are as bad as the cocks, so that when sending out to a show, there is always the fear of a few battles when the hens are all placed in the runs again. There are several different colours, but the only one at present that we are acquainted with is similar to the ordinary Indian, though much darker. The pure white is much valued in its native sphere, and proves equally courageous in combat.

—— **SUMATRA.** This variety of fowl, usually referred to as Black Sumatra Game, is one of the most graceful yet introduced into the show pen. Though there would appear to be other colours of this race, the Black is at present the only one known in this country. The breed takes its name from the island of Sumatra, East Indies, where it originated, and where it is used very largely for fighting. Although Game by name, the Poultry Club do not allow them in the same class as the Modern or Old English, so that where not specified their rightful place is the A.O.V. class. It is very probable that they are the bird known many years ago as the Pheasant Malay, which had some share in giving colour and gloss to the Indian Game. They certainly are a very old race and have been known by various names in America, where they "caught on," before finding a place in this country. Laying a white egg, they are an exception to all the other Asiatic breeds of fowls, for which there seems no explanation. They are very active in their habits, and yet docile in disposition till upset, and while doing fairly well in small runs, show their beauty best on the open field where the light of day can bring out their colour to perfection. Their pea combs are set on a small neat head, they have dark red eye, dark green legs, and a body colour of a brilliant beetle green, with a vivid lustre which looks all life. While the hen is very neat, closely feathered, showing only a fair-sized tail, the cock is very handsome and attractive. The tail is carried low down as in the ordinary pheasant, and should be of considerable length. The tail coverts and saddle hackle must be full and long, fine as silk and as green as a beetle. These are points that count for much when judging them, and should be looked for when mating up the breeding pens. With this the neck hackle will be full, so that one gets profuse feathering on a small graceful body carriage. With all the feather, the bird must appear light and active, otherwise it is out of keeping with the character of the breed. Up to the present the bird is rather small, but with care and selection in breeding this may improve. Like all Game fowl the

Sumatra has a nice full chest, legs set fairly broad, but very firm, and the legs and bone generally are very fine—thick legs taking away the beauty of the bird. A club has been formed to watch its interests, but so far the breed has not made much headway in this country. (*See Plates Nos.* 44 *and* 45). "Indian Game" *see* special article.

GANDER. A male goose.

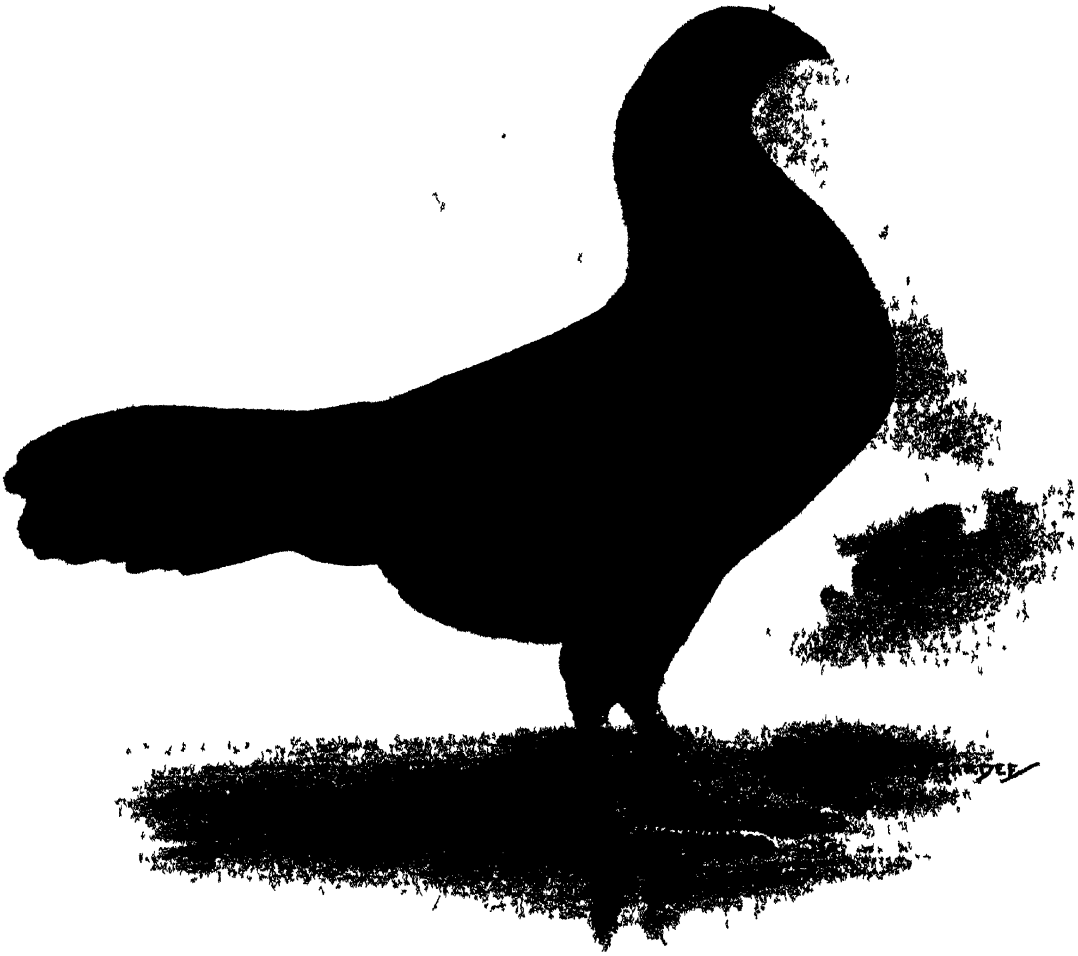
GAPES. This disease is much to be dreaded amongst chickens and young pheasants. It rarely affects turkeys, and is never known amongst ducks, probably on account of their water habits. It ought strictly to be included amongst parasitic diseases of poultry, because it arises from the presence of worms in the wind-pipe (*syngamus trachealis* is the Latin name of the parasite). Scientists are not by any means agreed as to how these worms get there. But the fact remains that they are to be found in the wind-pipe of chickens, and they are very fatal unless speedily dislodged. The name itself describes the symptoms of the complaint precisely. The chickens open their mouths and gape and stretch their necks in the effort to breathe, for the worms, being lodged in the wind-pipe, make breathing impossible as they grow and ultimately cause death by suffocation. There is always a disposition for chickens to gape when they have bronchial trouble of any kind, but bronchial trouble is readily distinguishable by anyone who is at all observant. Where a chicken is constantly gaping, and is evidently in real distress such as can only be due to gape-worms, take a long, soft feather, dip it in turpentine and gently insert it into the wind-pipe and twist it round, when, if gape-worms be present, one or more will immediately be dislodged and will be coughed out. This is the best and most effective method of treating gapes. The feather dipped in turpentine as described is the only method which will effectually dislodge these worms. Many other methods have been suggested, but all are more or less unsatisfactory. One plan is to half-suffocate a bird in smoke fumes, and various plans have been tried to make the chicken sneeze, and bring out the gape-worms in that way. One plan has been to shut the chickens up in a box under the influence of carbolic vapour, but this is highly dangerous, not to say cruel. In any event, the chicken will try to sneeze of its own accord, without any forcing, and it is when a chicken cannot sneeze out its unwelcome guests that it becomes necessary to take steps to dislodge them.



Chicken with Gapes.

But, apart from the cure of gapes, what is of most importance is, that steps should be taken to prevent their appearance at all. It is a well-known fact that this plague comes on year after year in the same locality. Some localities favour its presence, while in other districts it never appears at all. Low-lying marshy lands are believed to be favourable to the development of the parasite. It is, therefore, very important that, when once gapes has made its appearance on a particular piece of land, that land should not be used again for chicken rearing until it is quite certain that it has been thoroughly disinfected in such a manner as to make it impossible for any of the worms or their ova to remain. Pheasant rearers have long recognised how necessary it is to have fresh ground year by year for their young pheasants. The usual plan adopted for cleaning the land is to thoroughly lime it, and let it lie fallow, or at least, let grass grow upon it for two years. All coops and runs in which

PLATE NO. 45



Black Sumatra Game Hen.

(*Bred and exhibited by Mr. T. R. Eaton, Norwich.*)

Winner of 1st and Cup Black Sumatra Game Fowl Club Show, 1907.

chickens are kept which have been suffering from gapes, should be cleansed and disinfected on the same lines.

GASTRITIS. Gastritis is really a form of indigestion, and is not readily distinguishable from it. It is a condition in which the gastric juice fails, or is unable to cope with the work required of it. A fowl's food is first softened in the crop, thence it passes into the proventriculus and there it comes into contact with the digestive juices proper. Obviously, if a fowl is suffering from gastritis the symptoms would be the same as in a case of crop-binding. (*See* "Crop Troubles and Indigestion").

Flock of Embden and Toulouse Geese.

GATÉNAIS (*see* "French Breeds.")

GEESE. **GENERAL MANAGEMENT.** In comparison with other descriptions of feathered stock the general management of geese is very simple, but on the other hand their requirements are of such a special character that only farmers, or those who occupy or have rights over grazing land, can keep them profitably. The economic aspect of goose breeding has undergone various modifications during recent years, and it is not nowadays advisable to stock even the most extensive range too heavily with these birds; the modern demand being restricted, and less seasonable than was formerly the case. Nevertheless the smallest production necessitates a suitable character and extent of range. Although all poultry are in some measure grass eaters, the goose is a persistent grazer, and unless there is a sufficiency of their natural food, the cost of keeping stock birds all the year round and rearing goslings to a killing age is increased out of due proportion to the marketable return; whereas if there is plenty of grass available they may be kept in health and hardiness at a very trifling cost beyond the feeding value of the herbage consumed, and in the case of the commoner, the expense is still further reduced. The quality of the herbage is naturally an influencing factor, and although these birds prefer a rich pasture they will thrive upon rough grass land which would fail to support other and larger stock; nevertheless, even on more valuable pasturage they are innocent of the destructive habits so often charged to them, their so-called "damage" to the sward consisting primarily in the eradication of the undesirable ranunculus, and if the land is not overstocked, they will not foul it to the detriment of cattle or horses. Relative to the stocking of waste places with geese, it may not be generally known that some species differ from others in their habits of feeding—that, whilst some do better upon cultivated pasture, others will preferably exist in marshy and uncultivated places. The Canadian goose, for example, feeds largely upon aquatic plants and the roots of marshy vegetable growths, and would, therefore, in suitable situations in no material way displace the ordinary grazing stock of the farm.

Some extent of swimming water is also requisite, and although a pond may suffice, a running stream is preferable, as in the case of any class of waterfowl, water being required for necessary swimming exercise, the maintenance of health and cleanliness, and the securing of fertility in the eggs. Geese use water much less frequently than ducks, and provided it is accessible night and morning no special provision need as a rule be made for its supply upon the grazing grounds, unless it is naturally available.

——**HOUSING ARRANGEMENTS.** It will in the first place be apparent that such large birds require plenty of room and floor space in all their quarters, and it should be understood that they thrive better in houses appropriated entirely to their own use than when herded in with other poultry. As a matter of fact all classes of fowls require different treatment, and should be housed separately; and it is never satisfactory to use a common roosting place for gallinaceous birds and waterfowl, the one description roosting on perches, and the other sleeping on the ground. The natural hardiness of geese and their general comparative immunity from disease can only be fully maintained by the observation of the simple laws of sanitation and health in their sleeping quarters. Fresh air and plenty of it, with an adequate method of ventilation, and the avoidance of draughts and damp floors, are therefore essential. A goosery may be of any shape, and no special form of structure is required, provided the roof and walls be sound, the floor bone-dry, and the front either wholly or partially open, and open portion covered with wire-netting. The floor must be suitably bedded with any form of ordinary bedding material, but if rough cut litter is used it must be free from thorns, furze, or brambles, which would inflict injuries upon the feet. In most cases where a permanent building is available in the neighbourhood of the farm yard it will serve all the purposes of the stock birds, and the goslings when they are large enough to run with the adults; because geese will always return to their quarters after a day's grazing, and if they are stubbled on distant and unfamiliar fields, they are easy birds to herd and drive home at nightfall. When there is no such available accommodation a sufficiently large movable house, of the span roof type fitted with an open side and shutter, is the most suitable for the purpose; and may be moved from field to field, as the necessity arises. For the use of the young birds, during the short period they are brooded by hen or goose, coops should be used of dimensions suited to the size and number of goslings housed in each; but the sooner they can be transferred to sheds or houses of more ample proportions, the better they grow and develop. Some provision must also be made for the restraint of the goslings during their early days of rearing, and until they are strong enough to be allowed liberty with their attendant hen or goose; and for this purpose wattles or wire-netted poultry hurdles are the most simple of arrangement and necessary readjustment when moved to clean ground.

—— **BREEDING.** In relation to the selection of stock it is most desirable to avoid the use of immature birds for breeding purposes, and the most desirable method of stocking these birds at the commencement is to purchase well-grown geese of ascertained age and to mate them with an unrelated well-matured gander. After their first laying season the eggs of geese are suitable for incubation in varying degrees of fertility, but those of older birds are as a rule more uniformly reliable than those of birds in their first few years of production. It is almost impossible to state the limits of their profitable production, these birds living and laying to a comparatively great age; and the writer has possessed geese of the known age of twenty years, which produced an annual percentage of fertility unattained by any younger birds he has ever kept, in addition to a high laying record. Apart from the reputation of breed or strain, the selection of individuals for breeding should be influenced by the width of breast, length of body, and relative shortness of legs. The early autumn is the most appropriate season for the acquisition of both geese and gander, and they should at once be turned down on their permanent range, so that they will be fully acquainted with their surroundings and in a suitably settled condition for breeding in the following spring. It is, of course, true that they will be fed for some months before they begin to be in profit, nevertheless, it is the most economical method in the long run, and if their purchase (and familiarity with their situation) is delayed until later it will almost inevitably postpone the commencement of production, and by missing the earliest market more would be lost than gained in the ultimate returns. Geese will as a rule begin laying sometime during February, and if they are discouraged from incubating their first batch of eggs, they will soon recommence laying, and continue their production until about midsummer. If a permanent building is allowed them for sleeping quarters, they may easily be accustomed to lay their eggs in large loose rough nests, in the corners of the shed or house, otherwise they will follow their natural inclinations and some eggs may be lost, or spoilt by the weather in the early months. A goose requires plenty of soft litter for nesting material, and follows her wild protective instinct in covering her eggs with litter when she leaves the nest.

Although the period of incubation is as long as 35 days in one species, the usual time with the common domestic varieties varies from 28 to 30 days, usually the latter. In making a nest for setting goose eggs it should be placed upon the earth, using any of the ordinary suitable materials for its construction; and if a hen is to undertake the incubation, it should be of a size to hold four goose eggs, but a goose will comfortably manage from ten to a dozen. There is no necessity, when they are set upon an earth bottom, to sprinkle or damp the eggs; but when entrusted to an ordinary domestic hen they should preferably be turned daily, being too large for most hens to move sufficiently. There should as a general rule be no interference during hatching, except the possibly necessary removal of the empty shells; but when any undue difficulty occurs, and there is danger of a prolonged hatching period, some slight assistance is allowable, such as the further breaking of a hard shell, if it has been already chipped by the imprisoned gosling. In general, however, the gosling of mature and well-managed stock will be sufficiently vigorous to hatch without any help, and in no case should any assistance be rendered until it is judged to be absolutely unavoidable. The stock birds at breeding time require a small allowance of soft food in the early morning, and a feed of corn at night.

—— **REARING AND FATTENING.** The general details of rearing will be found set forth in the article headed "Rearing," and all that it is necessary to mention in connection with the subject here has more direct reference to the subsequent treatment of goslings, after their early rearing period, in preparation for the various objects of their production.

Such as are to be killed right off the grass, without any special fattening, as "green geese" should not be allowed swimming exercise, and their grass range should be of good quality, but not so extensive as is allowable in rearing for other objects. After the age of a month, two good meals daily should be allowed of a mixture of middlings and barley meal, with the possible addition in some cases of a small allowance of meat. These birds should be fit to market at or before three months. Goslings for Michaelmas marketing should be treated on somewhat similar lines up to the same age, when they may be folded on turnips if they are available and allowed a greater freedom of range as regards grazing. As the season advances the dificiencies in the feeding value of the herbage must be rectified in the altered character of the supplied food, the maintenance of good condition being essential, but fatness is not required until they are fed with that object from about a month before killing day. During the final four weeks the range must be again reduced, unless there is a sufficient area of stubbles for the fattening purpose; otherwise the fat condition depends upon the hand feeding. If they are run on grass right up to the end, they will require to be fed liberally twice daily, for which purpose many breeders use good sound oats.

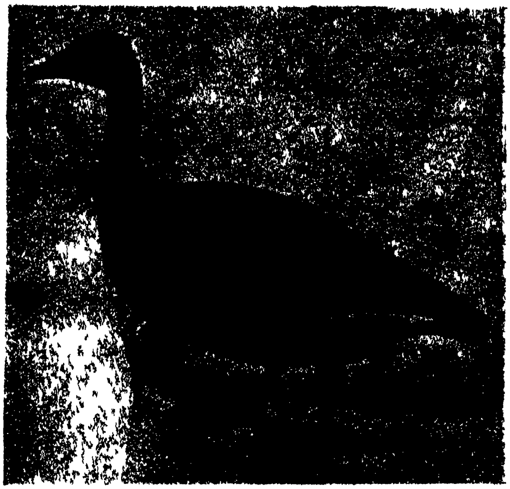
Fat geese for Christmas require yet other treatment, and may be run with and treated like, the adults after their early rearing period, care being taken to maintain condition and progress throughout. About four weeks before Christmas these birds require to be confined to a large and suitable shed, preferably open fronted, and fed liberally and suitably, using barley meal or Sussex ground oats for soft food mixtures, and barley or other good grain at night, with a sufficiency of green food.

—— **KILLING AND MARKETING.** Killing is best effected by dislocation of the neck, although it is in some districts performed by stunning the bird and severing the jugular vein. As with all poultry, goslings should be sufficiently fasted before killing. Plucking should be immediately commenced, and finished before the carcase cools; leaving the wings and neck unplucked, or otherwise plucking according to the custom of the market catered for. After trussing suitably for local requirements the carcase should be placed on a shelf and pressed until cold, when the bird will be ready for packing; geese being preferably consigned in crates, and packed tightly enough to prevent shifting in transit. Relative to the general subject of marketing, see the article under that heading.

——**COMMON DOMESTIC VARIETIES.** For a more detailed account of the origin of the domestic goose and some other facts of the history of domestication, the reader is referred to the article under the heading "Origin," and it will only be necessary by way of present introduction to say that the common domestic varieties are derived from the Grey-Lag, or Common Wild Goose. Relative to the chief general distinctive characteristics of the genus it may be noted that they include a short thick bill, approximating to the length of the head, and more deep than broad at the base; with a slightly hooked termination of the upper mandible. The neck is moderately long and slender, the body about as deep as it is wide, and the legs are placed well-forward. As regards habits, although, with the exception of swans, they are the largest swimming birds, geese spend only a very small proportion of their time on the water; and although in domestication their power of flight has very largely fallen into desuetude, in a state of nature it is considerable in relation to size and weight, in comparison with other domesticated fowls, and although many species appear to be capable of domestication without much trouble, it is noteworthy that for practical purposes we are almost entirely confined to the descendants of the Grey-Lag, and that the points of difference in the common domestic varieties are very small, the two varieties used in practical production being the Embden and the Toulouse.

—— **EMBDEN GOOSE.** As to the reason for the association by name of this variety with the place named Embden in Westphalia, it would be difficult to account, and it does not appear that any satisfactory explanation is on record, but the point is of no practical importance. What is of interest to note is that although it differs in colour, and to some extent in contour, from the Toulouse, it would be difficult for practical producers to decide which of the two varieties is entitled to the first place in point of merit ; and it is perhaps no exaggeration to say that the majority of producers solve the difficulty by crossing the two varieties for the production of the best goslings for table use, the progeny of the cross breeding being possessed of a good large frame, and capable (in the hands of a skilled fattener) of attaining to greater weights than would be possible in the case of the parent stock ; but if such a production is carried beyond the first cross there is the ever present danger of degeneracy showing itself in any subsequent generation.

To return to the variety under immediate consideration. Its characteristic colour of plumage is a spotless white throughout, and any other colour, or spots or splashes of colour indicate impurity as regards the ancestry of a strain, a point of some importance in cross-breeding, the efficacy of which depends primarily upon the purity of the parent stock upon both sides of the breeding pen. As regards the character of the plumage the feathering is close, and the neck feathers arrange themselves more or less in ridges, and the general contour and carriage of the breed is rather more graceful than in the Toulouse. Length and straightness of head are characteristics, and the bill is short and stout. The neck is inclined to be long, in uninterrupted continuation of the lower mandible, and gracefully curved and carried. The body has breadth and depth, the back length and straightness, and the breast solidity. The tail is horizontally straight, and its feathering close. The wings are very powerful in striking, and large when spread, and the legs are short, thick, and firmly set. The carriage is inclined to be generally upright and tall. The bill, legs and feet are orange in colour, and the eyes light blue.


—"*The Bazaar*"

Grey-Lag Goose.

Although the Grey-Lag, which is the stock of the domestic varieties, seldom attains a greater weight than about 10 lbs., the Embden is capable of attaining from 30 lbs. to 34 lbs. in the gander, and 20 lbs. and upwards in the goose. A more usual average for breeding stock would, however, be 20 lbs. and 18 lbs. respectively. (*See Plate No.* 46).

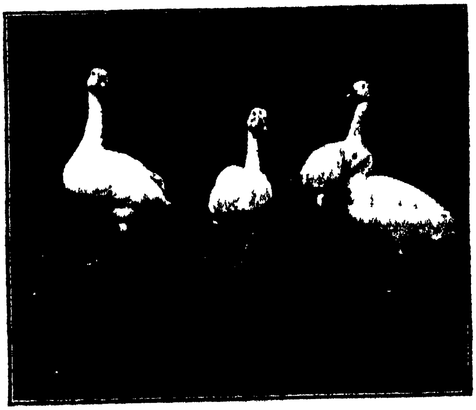
—— **TOULOUSE GOOSE.** As in the case of the Embden there is no satisfactory explanation of the reason for the naming of this variety, and its association with a chief town of Languedoc is obscure. The predominant colour of the Toulouse variety is grey, dark as regards the upper parts, but becoming lighter and gradually merging into white on the under parts; the bill is red to flesh colour, and the feet and legs a reddish orange. The wings are large when spread, and the tail short and close feathered. The body is compact and full, with a convex-shaped back, and the bird does not stand quite so tall or upright as the Embden. In general the Toulouse attains to greater weights than the Embden, although exceptionally heavy specimens are to be avoided for breeding purposes; and geese of this variety are not usually such reliable mothers as the Embden, although such characteristics are very largely a matter of strain. Both varieties are remarkable examples of the possibilities of domestication as regards increase of size and weight, and as has been indicated, the crossing of the two is productive of a still larger and heavier progeny in the first cross. In crossing the two varieties some authorities suggest that the gander belongs to the Toulouse variety, and the geese to the Embden; but mated in the reverse order quite as good results are obtainable.

Flock of Toulouse Geese.

—— **OTHER SPECIES.** The foregoing are the ordinary varieties of the common goose as known in domestication in this country, but of the many other species, some of which are to be found in captivity in the United Kingdom, there are six or seven which demand some special reference on account of their adaptability as regards some of the circumstances of domestication, and their more or less economic characteristics. As with some other descriptions of poultry the domestication of the goose has been limited, and there is ample opportunity for the further development, upon practical lines of production, of the possibilities of some of the lesser-known species, it being remembered that, as in the case of gallinaceous birds, some are more adaptable to certain conditions than others.

Canadian Goose.

-THE CANADIAN GOOSE. Relative to the natural history of this species Miss Hubbard writes: "The habitat of this handsome goose is, as its name implies, North America, from whence it occasionally visits England, where specimens at different times have been shot. Yarrell therefore, includes it among British birds. This hardy species is distributed all over the United States, and extends its travels into the Arctic regions. In Hudson's Bay it is shot in great quantities by the settlers, who depend much upon these birds and on their eggs for food. When in good condition these geese weigh about fourteen pounds, and being free and hardy breeders, would be a valuable addition to the game birds of our country could they be reared in sufficient numbers to afford sport." The species has been imported into and bred in this country to some considerable extent, having been first introduced about two hundred years ago as a domesticated bird. As regards its economic qualities, as apart from the sporting aspect to which Miss Hubbard refers, it may be noted that the Canadian goose is a much less persistent grazer than the common domestic varieties, and thrives upon marshy land, feeding largely upon aquatic plants and their roots, and might, therefore, be suitably stocked by owners and holders with such more or less waste land at their disposal. It has been partially domesticated in most European countries, and breeds with signal success upon the lakes of some English estates; although its graceful and almost swan-like appearance especially commends it to the attention of ornamental water-fowl breeders, it is possessed of useful qualities worthy of the attention of practical producers.



American Geese.
Bred in Zoological Gardens.

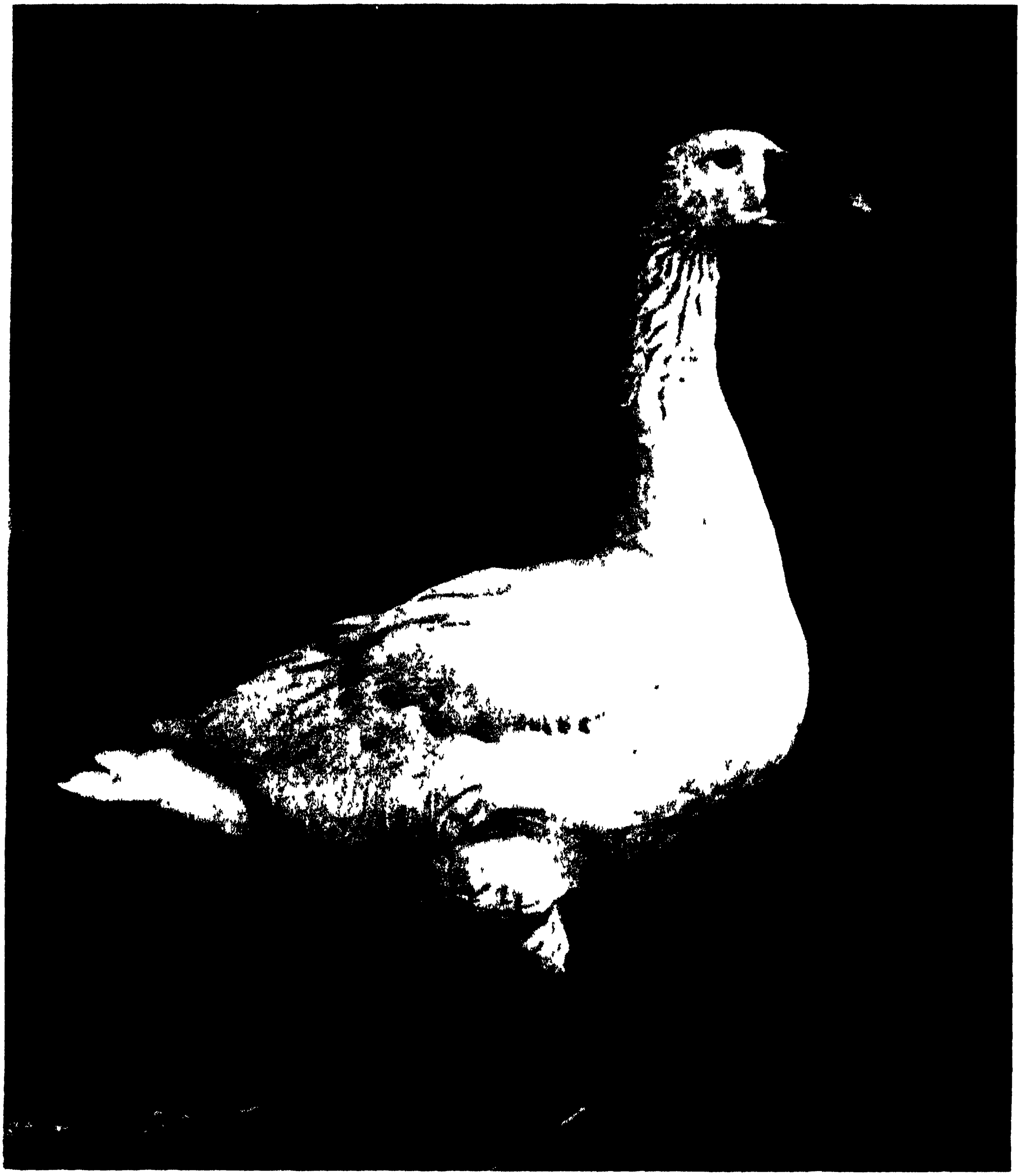
In general appearance, and especially upon account of its long and slender neck it approximates to the swan, a similarity which is increased when the bird is upon the water. It exceeds the common domestic varieties in length, but not in weight, measuring some three-and-a-half feet from bill to end of tail. As regards colour of plumage, that of the head and neck is black, the throat having a white cravat extending to behind the eyes. The colour of the under parts is fawn, with a margin of white; that of the wings and back is brown, with a white edging; the tail, bill, legs and feet are black, and the eyes are brown or greyish. The legs are inclined to be long and the carriage stately. The cry is of a peculiar hoarse description. The colour of the female is similar to that of the male, the eggs are a greenish-yellow, and the period of incubation is thirty days. The quality of the flesh is excellent, and the general management similar to that of other breeds, whilst it is an economical feeder, altogether worth inclusion in the farm stock and development upon commercial lines.

Chinese Geese.

—— **THE CHINESE GOOSE.** This species is known by various other names, such as the Hong-Kong goose, the Knobbed goose, the Spanish goose, the Swan goose, the Siberian goose, and other unwarrantable terms. It is widely distributed in its wild state over China, Asia and Africa; and the Indian domestic variety is said to number it among its ancestry. It is easily domesticated, is thoroughly hardy and easy to rear; and is attractive as an ornamental bird. Economically, the females are prolific layers, commencing egg production very early, and the flesh is excellent for table purposes, and highly flavoured. The goslings are quick growers and are easily fattened. The Chinese goose is a less persistent grazer than some others, and spends more time on the water; they do not thrive without plenty of space and liberty, unless allowed the freedom of large ponds or lakes, and they are very noisy compared with some others. In domestication these birds are capable of attaining good weights when suitably bred, fed and managed.

There are two varieties of this species, the White and the Grey, but the general characteristics are similar. The neck is long, and there is a knob at the base of the bill; with, moreover, a dewlap hanging from the lower mandible and throat.

PLATE NO. 46



Embden Gander.

(*The property of Miss M. E. Campain, Deeping St. Nicholas, Spalding.*)

Winner of 1st Dairy, 1906 and 1908, 2nd Dairy, 1907, and several 1st and other prizes at Birmingham, Manchester, Redhill, Lincolnshire County Show, etc.

The plumage of the white variety is pure white throughout, with a deep orange bill, legs and feet; whilst that of the grey variety is on the upper parts greyish-brown, striped deeper brown from head to shoulders, and becoming greyish-white beneath, with black eyes, bill and legs. The female is similarly coloured, but smaller in size; the eggs are white, and the incubating period from twenty-eight to thirty-two days. The head is large, bill slender and curved, body comparatively small, legs long, and carriage graceful and erect.

——**CEREOPSIS GOOSE.** The name of this species means wax-face, and has reference to a cere which covers the bill at the base of the upper mandible. It is a native of Australia and the only species of its genus, chiefly differing from the others as regards the characteristic cere, the short, sharp curved bill, short thick neck, and short toes. It spends more time on land than on the water, being a good runner, but a bad swimmer; nevertheless, although it is reputed to be of a quarrelsome disposition, it is perhaps less difficult in this respect than the Egyptian goose, but both are rather inclined to be savage and to make a too free use of their wings if interfered with, so that they cannot be kept in company with other water-fowl. It is also useless to attempt to keep them economically unless there is plenty of available herbage, as they will soon clear an enclosure of all the grass. They are, however, free breeders in captivity, being at one time kept to a considerable extent as ordinary stock in their native country. In this country they require a sheltered situation in winter, as they cannot stand much in the way of cold winds and frost, although with adequate protection they will thrive well enough. The species is in form not unlike the common domestic goose, which it is capable of equalling in size, and the young appear to prefer naturally gathered food to that supplied by hand; their flesh is excellent for table purposes. The plumage is grey-brown, with black tail and shoulder feathers; the head is grey-white on the upper part, and the back is decorated with brownish spots. The eye is red, as are the legs, and the feet are black. The eggs are a dirty white and small, the period of incubation being from a month to thirty-five days.

Sebastopol Geese.

——**EGYPTIAN GOOSE.** The Egyptian or Nile goose is the bird frequently referred to by various classical writers, and figured on Egyptian frescoes as a sacred bird of that country. Its resemblance, especially in colour, to the Sheldrakes has been remarked by most writers. It has been described as the most ornamental of all geese, and the conformation of its tail, together with its slender form, general elegance of carriage and reddish-brown colouring, distinguish it from all others. A native of Africa, it has in its wild state a range from Egypt to Cape Colony, is to be seen northwards in many European countries, and has been frequently shot in England. It spends a good deal of time on the water, but feeds upon a wide range of vegetation and includes animal food in its dietary. Its quarrelsome nature is the drawback to its keeping in captivity in the company of other water-fowl, and its flesh is darker and coarser than that of other descriptions; but it is possible that a general improvement in disposition and economic qualities might result from a more complete domestication and submission to the general management of the poultry breeder. In captivity it will thrive largely upon a corn diet, and appears able in such circumstances to do better than most others upon a limited extent of grass. In common with the so-called spur-winged goose, it has a short spur instead of the usual knob upon the wing joint, and uses its wings (as well as its bill) very freely in combat with its fellows, other fowl, or at times its keepers. As to colours, the plumage at the sides of the head and the front of the throat, is white; around the eyes and neck it is a red-brown; the upper parts of the body are black, and the under parts are fawn, yellow and chestnut. There is some white in the wings, and the tail and flight feathers are black. The eyes are orange, the bill red, and the feet and legs yellowish-red. The colour of the female is similar, but less bright; the eggs are tinted white, and incubation occupies a month.

——**SPUR-WINGED GOOSE.** Inhabitants of Africa, the species of this genus do not appear to be found elsewhere by migration, although they are often kept in captivity, breeding and rearing to a limited extent. They are all more or less savage and quarrelsome, and their characteristic wing spur is used as a weapon of attack. The bill is large and strong, and is fiercely used in combat. The body is rather long and slender, the legs stout and the feet strong and furnished with sharp claws.

Although there is a large species in East Africa, and another with black plumage in the South-east—both of which have been subjected to partial domestication—it is the Gambian, of North East Africa, that is perhaps the best known. This latter is a bird of some size and weight, tall and of upright carriage, which although shy in confinement will breed and rear under suitable conditions and management. As regards colour it is in general greenish-black on the upper parts, with brownish-white face and throat, white being the colour of its breast, under parts and shoulder. The feet are a red-yellow, the bill reddish and the eye brown. The female colouring is the same, but in point of size she is smaller; the eggs vary from yellow to white.

——**BERNICLE GOOSE.** The Common Bernicle is a species of the same genus as the Canadian goose—all the eight species of the genus inhabiting the northern parts of the globe, and the members of the group differ from true geese in that they have a short and narrow bill, high in the centre, another distinguishing characteristic being the smoothness of the neck plumage. The common Bernicle is much smaller than the domestic goose, approximating to two feet in length, and about four pounds in weight; but as it is easily kept in a state of domestication, and is a free breeder, it is very suitable for stocking ornamental waters—its appearance being attractive. The colour of head and throat is white, with a black bill and a black stripe from the bill to the eyes; the top of the head and neck is also black, as also is the breast. The remainder of the plumage is grey and black on the upper parts, and white on the under parts. The legs are black, and the eyes brown. The female plumage is the same as in the male; the eggs are white, and the incubating period a month.

In addition to the foregoing there are many other species of geese, several of which are to be seen in collections and upon ornamental waters; and occasionally some of the rarer sorts are seen at exhibitions, which include classes for water-fowl. Broadly speaking, the methods of management already detailed in the article "Geese—General Management," are applicable to all descriptions of geese; but there are certain differences as regards the feeding and management in breeding of some of the more uncommon species, regarding which the amateur would require to obtain particular information before attempting to keep them.

GENUS. A group of species, closely allied by common characters (*see* "Origin.")

GILLS. A term applied to the part of the throat under the beak, sometimes including the wattles.

GIZZARD (*see* "Digestive process.")

GOSLING. A young goose.

GRAIN (*see* "Feeding stuffs.")

GRASS (*see* "Accommodation" and "Feeding Stuffs."

GREAVES (*see* "Feeding stuffs.")

GREEN FOOD (*see* "Feeding stuffs.")

GRIT. Grit is essential to the well-being of all fowls, both in confinement and at large. Possessing no teeth to perform the function of mastication, digestion is impossible unless the gizzard of the fowl, into which the food passes after it leaves the crop, is aided in its work by hard sharp particles of stone. When at liberty instinct teaches fowls to forage for these particles, but if they are kept under conditions where a supply is not available, the grit must be provided. The kind of grit most suitable needs consideration, and it should be borne in mind that good or evil results may ensue according to the manner of grit supplied. First of all, poultry need sharp grit, and flint is the best, for it is both sharp and hard, and will grind up the food in the gizzard; but, in addition to hard flint, it is as well to have some softer grit that will mingle with the flint and make a better grinding-mill, so to speak. Limestone is very good for this purpose, and other kinds of grit are equally suitable. The grit should not be all of one size, but should consist of various sizes, as this is much more natural, and is more what the gizzard requires for its work. The shape of the particles should also be taken into account. These should be of a good round shape with plenty of corners sticking out, so that they will grind the food easily and perform their work in the best possible way. The tonic principles of grit must be considered—different kinds of rock contain different mineral substances, many of which are extremely useful. Limestone, for instance, provides lime, which is most essential for egg production, for egg-shells are practically composed of lime, and hens can obtain this from the grit if limestone is provided. Oyster-shell is also excellent for fowls for the same reason, and ironstone is a good tonic; in fact, there are many kinds of grit that contain such mineral substances, and they have an excellent effect upon the system. Of course, it does not follow that the only mineral substances a fowl gets it obtains from the grit it consumes. There is much lime in grass and corn, and fowls will always use first the lime that is in an easily assimilable form before they have recourse to the crude article which is in the grit they have eaten. Although fowls need grit, they should not be forced to eat it by mixing it up with the soft food, so compelling them to consume more than they require. It should be placed about in shallow trays, so that they can have recourse to it when they are disposed.

GUINEA FOWL. Guinea fowl are very attractive from an artistic point of view, but owing to the poor demand for them as table birds they are not bred to any great extent. They are generally found on farms where little or no care is bestowed upon them in the way of housing and feeding. The birds live on the "go as you please" system, picking up their food about the farm yards or meadows, and roosting either in the trees or on the high beams which support the roofs of the cart sheds, barns or other buildings. They are allowed to live an undisturbed life until they become too numerous for the comfort of the other fowls on the premises, with which they cannot be domesticated sufficiently to live on very friendly terms. The male guinea fowl is very pugnacious and will drive other fowls from their food.

Were the demand for Guinea fowl not so limited they would certainly be profitable birds to breed, as they consume for many months of the year a great amount of insect food. Their flesh is of a gamey flavour, whilst their eggs, which compare in number with those laid by some breeds of domesticated fowls, are of a pleasing colour and of a rich flavour. Poulterers generally offer Guinea fowl for sale during February and March, as it is then that game is on the decrease and chickens high in price. The birds weigh about 3 lbs., and carry a good deal of dark-coloured flesh on frames extremely light in build. The plumage of Guinea fowl is very attractive, being a slate-coloured ground evenly covered with round white spots, a variation consisting of dark spots and light ground. The head of the bird is peculiar, having red wattles, larger in the male than the female, and a bristly looking mane which extends some distance from the back of the head and down the neck. The neck where it joins the head is void of feathers, and is covered with a white kid-like substance. On a farm where they can be induced to live on amicable terms with other fowls, and where they are trained from chickenhood to take shelter with them, Guinea fowl are profitable birds to breed, as they are great foragers, and destroy an enormous amount of injurious insect life. In a year they will lay from fifty to eighty eggs, which, though small, and not in general demand, are useful for home consumption. Should the spring be warm, the hens will commence to lay about April, and will continue laying till August or September, according to climatic conditions, and the amount of insect life available. The best way to commence with

J. T. Newman.

Guinea Fowl and Chicks.

Guinea fowl is to secure a hatch of eggs and place them under a reliable broody hen, so that the chicks may be brought up tame and induced as they mature to roost under cover. The time occupied in hatching the eggs is about twenty-seven days, and when the chicks appear they should be left under the hen till they are thoroughly dry, and capable of running about. Both hen and chicks should then be given the shelter of a large coop with a barred front, about three feet long and two feet wide, and comfortably high. The front of the coop should be provided with a removable wired frame, so that the youngsters can be confined to shelter in wet weather, as damp is fatal to their well-being. The coop should be placed upon short dry grass. It is a good plan to drive stakes into the ground round, and a yard or so from the coop, and to attach fine mesh wire netting to these. The enclosure will form a splendid playground for the little chicks, and allow them more grass in which to hunt for insects. The coop should be moved to fresh ground frequently. Until such time as the youngsters can find their own food, they should be supplied, in addition to other foods, with a liberal amount of animal food in the form of finely minced lean meat, ants' eggs or maggots. During the first week they may be given stale bread crumbs mixed with finely chopped hard-boiled eggs; finely minced lean meat and chopped vegetables, fine biscuit meal soaked in milk, a few ants' eggs occasionally, and for the last feed of the day, some dry chick food. It is as well to soak this latter food before giving it to the chicks, and until they are a week old it should not be given dry. The soft foods should be changed daily, and fresh cool water and fine sharp grit should always be within easy reach of the birds. For the first few weeks the chicks require feeding six times during the day, or every two hours, as they have very small crops. Little and often should be the rule when feeding, and only as much food as will be readily consumed should be allowed, as food allowed to get stale would, if eaten, cause bowel trouble.

As the birds get older the soft food may be gradually decreased and the grain diet increased, but the supply of insect or other animal matter must be kept up, and when they leave the hen they should be induced to feed and shelter with other fowls, if such are kept. The house that is to shelter Guinea fowl and other poultry must be lofty, or the birds will become quarrelsome and soon discard the place. The perches must be placed as high as possible, high perching being a natural habit of the birds.

If it is desired to breed from the birds raised, one male should be allowed to two, or at most, three females. The former sex can be determined by his peculiar habit of strutting about on tip-toe, and arching his neck. His shrill cry also denotes his sex, as it is quite dissimilar to the "come back" note of the females.

The nests used for the hens to lay in should not be exposed to view, but should be made by means of a covering of rushes, dried grasses, or brush wood, to appear as natural and secluded as possible. The Guinea hen loves a quiet out-of-the-way place in which to deposit her eggs. The nests should be visited daily, and all the eggs but one removed. If one egg is always left in the nest, the birds will not get suspicious and seek fresh places in which to lay, and will be less inclined to broodiness, and will lay a larger number of eggs. Those eggs produced during the months of April and May are the most reliable for hatching purposes.

Guinea fowl are useful as night alarms. Not a footfall escapes their keen ears. The approach of a stranger is met with loud shrieks, not pleasant to listen to, and there are instances on record where night visitors with no good intent have been unnerved and put to flight by their shrieks or "come back" cries, and anyone hearing at night the cry of the Guinea fowl for the first time would be inclined to believe such stories. The experiment of swarming Guinea fowl with Game birds has been tried, but without success, as the former have quickly routed the latter. Guinea fowl may, however, be successfully "swarmed" in coverts by themselves, providing that such coverts are in a fairly warm and dry locality. Under such conditions, they should be kept for purely domestic purposes. The birds should be marketed in early spring, or, if kept for home consumption, they should be sent to table in winter, and while young, when they will form a dish both tender and delicious. Apart from the common Guinea fowl, there are other species, all of which it is believed have emanated from one common origin. Such are undomesticated, and, when kept in confinement are intended only as objects of interest.

HACKLES. The long, pointed feathers on the neck. Similar feathers on the saddle of the cock are termed "Saddle Hackles."

HAMBURGH. There is no bird in the show pen to-day more graceful and more attractive than the Hamburgh. In its various colours it is a source of beauty, for while the marked varieties have distinctive character with them, the black immediately catches the eye of the visitor, and arrests his attention, because of the graceful flow of feather, together with the formation of the head and its neat, natty appearance. The best known colours are the Blacks, Gold and Silver Spangled, and Gold and Silver Pencilled, although at one time other varieties have come to the front. Among these were the Whites, a colour not known now unless it comes from the light-coloured pencilled bred ones, then on the Silver side only, and there is always a danger of them throwing back on the marked variety. The cock breeding strains are more liable to throw those than the pullet strains, and the question of producing pure white birds would be only a matter of time and is in the hands of the pencilled breeders. We need only go back to 1860 to 1870, when several Northern breeders kept them, but no doubt the delicate plumage, coupled with the difficulty in getting a sound white lobe has had much to do with their decline. About this time there were a few Buffs being bred, and with the infusion of the Buff Leghorn to get the level colour, the head points lost ground and the shade gradually died out. Records have also been made of a Silver-laced Hamburgh, *viz.*, a black bird with a white lacing; also a Cuckoo or Blue Barred Hamburgh, a black barring on an Andalusian ground colour, and a Buff pencilled Hamburgh, the ground colour being the same as in the gold pencilled, but white instead of a black bar. These varieties would have been quaint in their way, but they never caught the fancy eye, and as soon as the promoters died out the colours died with them. To return then to the Black. We have a very handsome fowl and one that can lay claim to some degree of usefulness. Although not of much use for the table, the Hamburgh has often been described as an everlasting layer, and when kept on an extensive run has not betrayed this belief. In the Black colour counts for much, and this should be of a rich beetle green shade with as much lustre as possible. The pullets show this to perfection when up in full bloom, and should be even and sound right through to the tail. In the cocks, purple or brown feathers is a great fault, so also is any sign of red in the neck hackle, although this is very liable to appear from a pullet bred strain. The tail of all the colours should be as full as possible, and carried in a nice easy fashion, and not come up over the back like a squirrel's tail. Quantity of feather in neck and saddle hackle adds beauty and counts well for exhibition points, this, with a long tail, completes the body of a typical black Hamburgh. Now, while the saddle hackle should be fine and silky, the tail, tail coverts, and sickle feathers should be broad, the wider the better, and all these should be beetle green, the same as in the body colour. The leg colour should be a dark leaden blue, clean and free from any sign of feather. In appearance the bird should have a jaunty carriage, full, round chest, and be very sprightly and active. One of the primary features of the Hamburgh is the head. However good the body may be it stands no chance whatever against a good-headed specimen if the body be only moderate. The comb should be full in the front, show a lot of workings, or corrugations, and taper off from the front to the back, which finishes off in a nice long leader standing straight out, and well off the head. Both sexes are the same, although the hen is naturally smaller than the cock. The comb, face and wattles, the latter not too large, should be a rich cherry red colour, which with the green plumage shows up the white lobe. The lobe must be round and give the appearance of having been stuck on rather than grown there, of a soft kid glove-like nature, and be snow white. A blushed lobe is a fault, so also is one of an almond shape like that of the Minorca. The lobe of a well-proportioned Black cockerel will be as round as a florin, and about the same size. With the Spangles the head points run much coarser, and the lobe is not up to the standard of the Blacks. The pullets of the Silvers will hardly show any lobe, but this may come with care and selection in breeding. In shape and character these come up to the Blacks, and a nicely marked cock with a full tail is very attractive indeed. The body colour should be white or a rich golden brown, according to the variety, and the spangling black, or rather a beetle green. The shape of this marking should be round, and on the end of each feather. There is always a tendency for the marking to run down in a V-shaped form towards the shaft of the feather, but this should not be encouraged, though very difficult to eradicate. In the Pencilled variety we have the smallest size of the family. Although they all go under the name of the Hamburgh, it is only the Pencilled variety that came to us from Holland, and were originally known as Chittiprats. These have been improved very much since then in colour and marking, though very doubtfully as regards size. The Spangled variety emerged out of Lancashire and Yorkshire, and are the results of selection from the old Mooney and Pheasant fowls. How aged these are no one can properly trace, but the Blacks were exhibited under the heading of Black Pheasants at least one hundred years ago. The Pencilled then undoubtedly gave them the name and has largely given place to the Blacks. These should have the same features in carriage, feather, comb, face and lobe as the rest, the only change being in colour. With the cocks,

Silver Spangled Hamburgh.

either Silver or Gold, it is essential that each should have a finely laced tail, that is, a lacing round the edge of each sickle and tail coverts. In the hens the colour is the same, but the pencilling, better described as a barring, must be as fine as possible and even throughout. Clear cut marking, which runs right through the tail, rich and free from any pale patches, must be aimed at with the ground colour of the Golds. (*See Plate No.* 47).

HATCHING (*see* "Incubation.")

HAWK-BILLED. Hooked or aquiline beak.

HAWKS (*see* "Enemies of fowls.")

HEAT (*see* "Rearing, artificial.")

HEDGES, SUITABLE (*see* "Accommodation.")

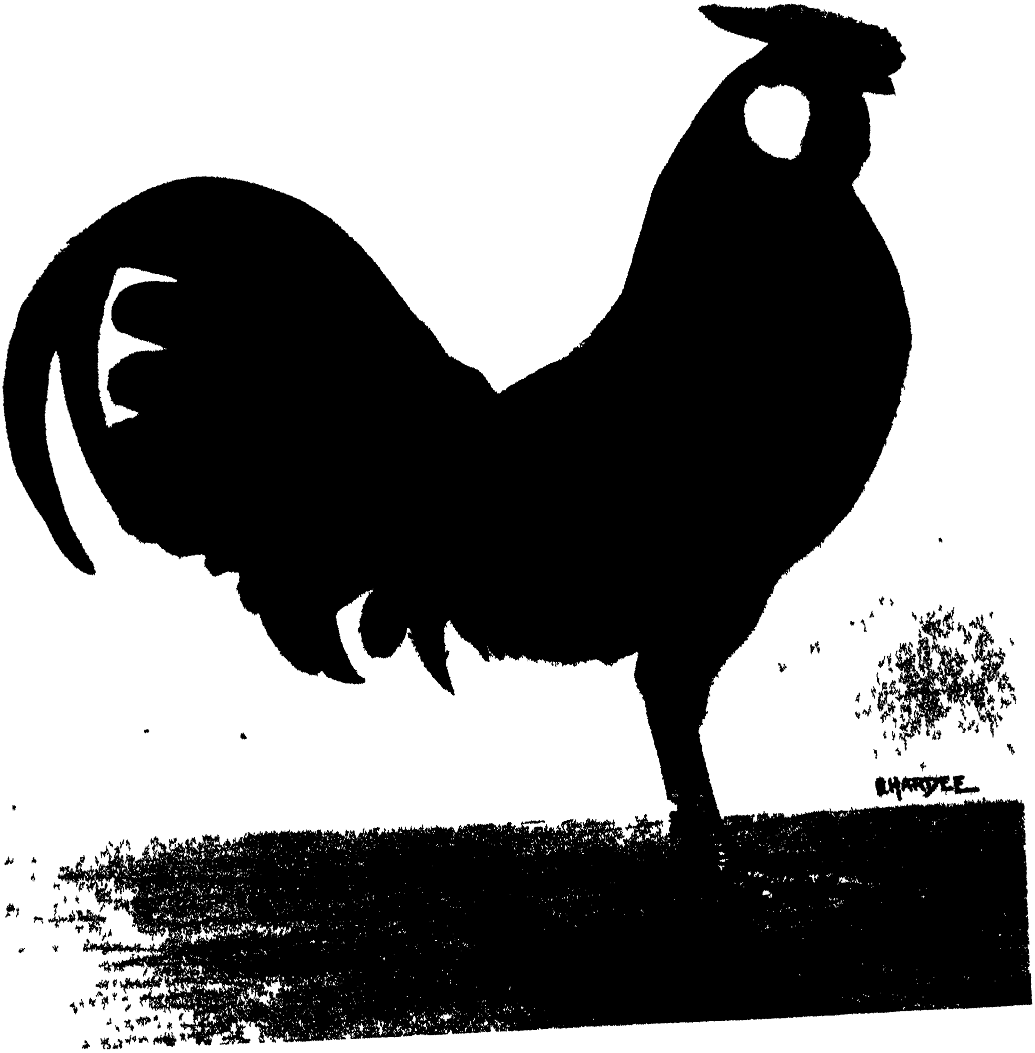
HEN-FEATHERED. A cock without sickles or saddle-hackles, as in the Sebright Bantams.

HENS, NUMBER TO COCK (*see* "Mating.")

HEREDITY, by which is meant ancestral influences, is as yet understood to a very limited degree. Such knowledge as we do possess is at the present time undergoing reconsideration in the light of later observations, more especially connected with what is known as Mendel's Law. (*See* "Mendelism.") Breeding is a complex problem, and the further it is extended the more numerous the influences exerting themselves are revealed. Certain characters met with in domestic poultry appear to have dominance over others, and in some instances these defy the skill of the breeder, who finds them recurring with persistence and determination. Yet in themselves they are of small value. How these have arisen cannot be stated. They are; which is all that can be said. An example of this is the fifth toe, which is a fixed character of the Dorking, and from that breed it has been handed on to other races descended therefrom. The peculiarity was known nearly 2,000 years ago, for Columella speaks of the "five-clawed breed" as common in Italy at the beginning of the Christian Era. So far as we know the additional toe is not used in any way. It gives no greater power to the foot, nor is it employed in walking or grasping a branch or perch. As an indication of breeding it is maintained, and the only point in its favour is that it is usually associated with good table qualities, though why that should be so is difficult to say. As to its persistence there can be no doubt, for that is within the knowledge of breeders. In some instances it is apparently lost when, either with crosses or new breeds when the Dorking is used, an attempt is made to breed it out. But it soon reappears in succeeding generations. This may be due to the length of time during which it has been a distinctive feature, thus giving a vigour which enables it to overcome the antagonistic influences, but that is a point upon which dogmatism is undesirable. Under these circumstances the weight of experience is distinctly in favour of maintaining a character which evidently has a value, though that has not been discovered, as it may be classed among the dominants.

——**LATENT CHARACTERS.** There are many other characters and qualities which may also be included among those which exert an influence for many generations, even though they may be latent for a longer or shorter period. These come within the experience of breeders of every grade. It is not uncommon for fowls which are apparently uniform in their character to produce chickens which develop features not found in any of the immediate ancestors, and which apparently have no justification or explanation.

PLATE No. 47



Black Hamburgh Cockerel.

(The property of Messrs. H. C. H. Whitley, Primley Poultry Farm, Paignton, S. Devon.)

Winner of 1st and Special Torquay, 1st Nantymoel, 1st Pontypridd, etc.

In cross-breeding this is evident to a marked degree, and many peculiar results are to be found. For instance, if a black plumaged cock and a white hen are mated some of the chickens may be all-white or all black, apparently following the dominance of one of the respective parents; or, if a rose-combed cock be mated with single-combed hens, some of the progeny will have pure rose and others pure single combs, though in both cases the dominant influence will not continue to the same extent, and the other will reappear later on to a greater degree. But what are known as latent characters have a much greater influence. In some cases, in spite of the greatest care in selection upon definite lines, even after several generations, features suddenly are found which upset the calculations of the breeder, and, perhaps, if he has purchased fresh stock, lead him to think that the birds thus obtained were not pure. There has been of late years an enormous amount of out-crossing among many races of poultry, the proof of which is seen in the development of latent characters which are antagonistic to the ideals of the breeder. In fact, it would appear that some characters, when once introduced, are never entirely lost, even though they may not appear for several generations. Much would seem to depend upon the length of time they have been perpetuated, but very often a change of soil or environment will have the effect of giving an impetus to the development of these latent characters, and there can be no question that the introduction of fresh blood derived from birds with very small racial affinity has a marked tendency in the same direction. Some characters appear in this way much more than do others. Colour of plumage, the fifth toe, feathers on the legs and feet, colour of bills in ducks and of skin in fowls may be cited as examples. But in some cases the latent characters are very partial and limited. The appearance of white or red feathers in the tail or wings, frequently but one or two such feathers, is very difficult to explain upon general grounds, but they present to the breeder a problem he has never yet been able to solve. These, and a multitude of others, are latent characters which must be recognised, and which add to the interest or to the difficulty of his operations. To some extent the same is found in qualities, though to a lesser degree. It must be understood that prolificacy in egg production, great flesh development, and suspension of the maternal instinct are all artificial and not natural, and are resultant from selection and breeding. Hence the tendency is ever towards reduction of the number and size of eggs, to lessened quantity of flesh, and to sitting at the right season of the year.

——**REVERSION.** We are thus led to the great subject of reversion and atavism, which is now receiving something of the attention it deserves from practical breeders. Both these terms refer to the reappearance of characters once typical, but now extinct. As Professor Davenport says: "Reversion is the term to use when the character belonged to a near-by ancestor clearly of the same species but several generations removed, while atavism is used to denote the appearance of characters belonging to exceedingly remote ancestors, perhaps even of different species." It may be accepted as true that, as a rule, reversion concerns the breeder, and that it is seldom, if ever, he finds any case of atavism. In this connection it is essential to remember that all animals are descendants of their ancestors, and that they are the product of their progenitors, or to quote Professor Davenport: "It is evident that inheritance is not limited to the visible characters of the immediate parent. We constantly forget that every individual is possessed of and capable of transmitting all the characters of the race to which he belongs. We forgot that his visible characters are not his total possession, but only those which are relatively most prominent in his case. Other combinations are easily possible out of the same elements in slightly different proportions, and it is not so strange as we think that a character once in possession of a race tends to persist indefinitely and, perforce, occasionally to become visibly apparent. It is as bound to appear, under the law of chance, as is the one black ball in the box of a thousand or a million, if only throws enough are made." But, as already pointed out, there is something more than chance in reversion, for influences such as change of soil or of food may tend to increase the vigour of the non-visible characters, and as the number of these is considerable in any breed or family it is not to be wondered at if one or other of these is seen with a fair measure of frequency. Many of the characters and qualities found in domestic poultry are artificial, some, in fact, are abnormal, and their hold upon the race is small as compared with others which for the time being are not visible. That there will always be this tendency to revert to ancestral type must be recognised, even with the most carefully bred fowls, but where selection is less rigid the influence is much greater. Thus, where crosses and out-crosses take place, reversion is much more rapid, which explains the great number of variations in ordinary poultry. But they will make their appearance even when the greatest care is taken in selection.

HIGGLER. One who collects chickens or eggs from the producer, for re-sale (*see* "Sussex chicken industry.")

HOCK. The knee-joint of the leg.

HOLLAND, WHITE (*see* "Turkeys.")

HOUDAN. The Houdan was the first of the French breeds to receive recognition by English breeders, and though it is difficult to tell when it first made its appearance in this country, it is certain that for nearly sixty years it has been regarded as a variety possessing both exhibition and utility properties. The breed was at first known in England as the Normandy fowl, but the name by which it is now designated the world over indicates the particular district in France in which Houdans have been extensively bred for many years.

French poultry-keepers have always been famed for their table poultry, and the Houdan undoubtedly possesses the properties that are required in fowls intended for the table. It has not, however, seriously threatened the popularity of our English breeds for that particular purpose, and it is somewhat curious that although in France it has been bred primarily for its utility properties, in this country it has perhaps found more favour for exhibition purposes, and for a number of years the Houdan has been a popular feature at our shows. Naturally it has undergone considerable improvement from the exhibition point of view, and even to such an extent that some of the best English specimens sent to a large French show received little sympathy at the hands of French judges. Yet it must be admitted that the breed has suffered very little at the hands of fancy breeders. Its size has been well maintained, the size and form of the crest and comb have been improved, shape has been fully recognised, the table properties of the variety have not been sacrificed, and it is really perhaps only in the matter of colour that English breeders have shown any uncertainty and departed from the French type. In that matter, however, there has been a great deal of variation, light and dark types coming into favour alternately, and at the present time many of the winning cocks are so dark that French breeders would consider them quite unsuitable for their shows, where even mottling all over the body is required.

The most striking feature of the Houdan is the crest, which, in the cock, is described by the standard as large, full and compact, with sufficient inclination backwards to fully expose the comb, while that of the hen is globular and more firmly set upon the head. The formation of the crest is a very important point, as a large but ragged crest, or one split in the centre, is not desired. It may be added that the peculiar formation of the skull, which has a spherical protuberance or poll, is common to the Polish race, of which the Houdan is undoubtedly an off-shoot, but the size and formation of this poll does not appear to have any effect upon the actual shape and extent of the crest.

The comb is another distinctive feature of this breed, being of the leaf or butterfly pattern. It is, indeed, very much in the form of a butterfly poised on the head, with wings well spread, and these, of course, should be of even size and formation. The comb of the cock is well developed, but that of the hen, though of similar shape, is exceedingly small, and in many of the best specimens is completely hidden by the crest. The beak is short and stout, of light horn colour, the eye red and prominent, the wattles well rounded, short in the cock, and, of course, smaller in the hen, whilst a good-sized pendulous tuft of feathers hangs beard fashion below the beak, and the face is furnished with large, compact whiskers on each side. The ear-lobes are small, and of a pinky white shade.

The body is large, rather long and square, with a broad and deep breast, long and straight breastbone, rather long and straight back, and wings carried well tucked up and to the side, while the tail of the cock is large and well arched, with plenty of long sickles, and that of the hen is of good size and carried well away from the body. The thighs are short and set wide apart, the shanks straight and free from feathers, and the feet well formed, with five toes, the fifth starting separately from the fourth and curving gently upwards. The legs and feet should be of a pinky white shade mottled with black, although in old birds this often becomes pale grey, while darker coloured legs, which are not desired, shade into blue with age. The weight runs up to 8 or 9 lbs. in cocks, and 6 or 7 lbs. in hens.

The plumage consists of a mixture of black and white, the white forming splashes or tips at the ends of the feathers, and producing a mottled appearance, which should be as even as possible. The black should have a pronounced glossy green cast, and it is worthy of note that the tendency in old birds is to moult lighter, so that in their first season they are generally darker than later in life. The crest invariably shows more white than other parts of the body, with the exception of the wings and tail, but the aim of breeders is to secure perfect uniformity of mottling all over the body.

As we have pointed out, fanciers of the present day favour a dark type, with the result that whilst the hens are evenly marked with very small tips of white at the end of each feather, cocks are frequently quite black upon the tops and hackles, and only show a little mottling on the breast and wings. Whether this fashion will continue no one can tell; but as it has given rise to some discussion in the fancy press and has been condemned by French breeders, it is possible that exhibitors and judges will, in the future, go for a lighter colour, with more mottling in the cock.

In breeding Houdans it is first of all necessary to study type, and an effort should be made to secure good size, for which purpose two or three-year-old hens will be found more reliable as breeders than pullets. The size and formation of crest and comb is another very important matter, and it is better to select birds with shapely crests even though they may be slightly smaller, rather than run any risk with very large but poorly shaped ones. The same may be said of combs, and it will be found that these characteristics can only be developed and improved with the most careful selection and inbreeding, though it is not necessary to mate separate pens for producing cockerels and pullets.

So far as colour is concerned, the best plan to attain the happy medium in mottling is to set off a light bird against a dark one. The most satisfactory mating is to select a cockerel with plenty of white, but as evenly distributed as possible, with hens that are rich in their black but rather short of mottling, and, given well-selected stock of the same strain, the progeny should include a good proportion of well-marked birds of both sexes. (*See Plates Nos.* 48 *and* 49).

HOUSES. In discussing the question of houses, two distinct types must be considered—those that are to remain in the same place year after year, and those, on the other hand, that are to be constantly moved about. When possible, housing on the portable plan offers the greatest advantages, and when there is plenty of space available this method should always be adopted. Not only is it more economical, but the fowls thrive better, are able to procure a large part of their own food, and the ground derives great benefit. An adult fowl produces from 80 lbs. to 100 lbs. of manure in the twelve months, and if this amount can be distributed instead of all falling on to a small space, the land receives considerably more good. If space is very restricted, the permanent plan of housing must be adopted, when special precautions are necessary to prevent the land becoming at all tainted or foul. Upon many places there is a brick shed, which, with a little alteration, can be made into an excellent poultry house. Bricks are too expensive to buy specially for the purpose, but sometimes, if an old building has been lately pulled down, the old bricks can be obtained for next to nothing, and such can with advantage be employed. An existing brick building usually requires some alteration before it is altogether suitable for the fowls; maybe there is a cement floor, which wants removing, no window, and little or no ventilation.

——**MATERIALS.** If a poultry house has to be specially constructed, wood is the best and the cheapest material to employ. Sound and well-seasoned boarding should be obtained, even though rather more has to be paid for it, as it comes so much cheaper in the long run. For permanent houses, it should be an inch thick, and for portable ⅝ inch. Inch boarding would undoubtedly be better in some respects for a portable house, but it is too heavy, and an essential feature of such a house is that it shall be light and easily movable from one place to another. The great fault with many poultry houses advertised by the various appliance makers is that they are made of too thin material, often only ½ inch and even ⅜ of an inch boarding. Wood as thin as this is not able to withstand the extremes of temperature; the interior resembles an oven during the summer, and a refrigerator during the winter. A house of this description can be greatly improved by covering the outside with felt—not the inside, as we have seen done, because this harbours insects and vermin. An excellent substitute for felt can be made at only a trifling cost. Tar the outside of the house, and, while still wet, lay on some sheets of brown paper or unbleached calico, then apply two more coats of tar. The paper or calico sticks firmly on to the wood, becoming almost a part thereof, and, if regularly tarred two or three times a year, it will last as long as the house. We have sometimes seen houses made of corrugated iron—a most unsuitable material alone, but, when lined with match-boarding, one that answers the purpose well. It is, however, more expensive than inch boarding, while its weight makes it useless for portable houses. Tongued and grooved planks should be employed, as this prevents draughts entering to the birds. Boarding of this description should always be fastened on in an upright position, and not parallel to the ground. In the latter case the rain soaks in between the boards, whereas, if placed on perpendicularly, the water runs straight away. If for any reason the match-boarding must be placed on horizontally, then the tongues should be uppermost; if the grooves are in this position, the water remains, speedily causing rot to set in. Another form of very good timber is weather-boarding; it is cheaper than the tongued and grooved but does not last quite so well. With this class of timber the boards must be placed on horizontally, overlapping one another about ¾ of an inch.

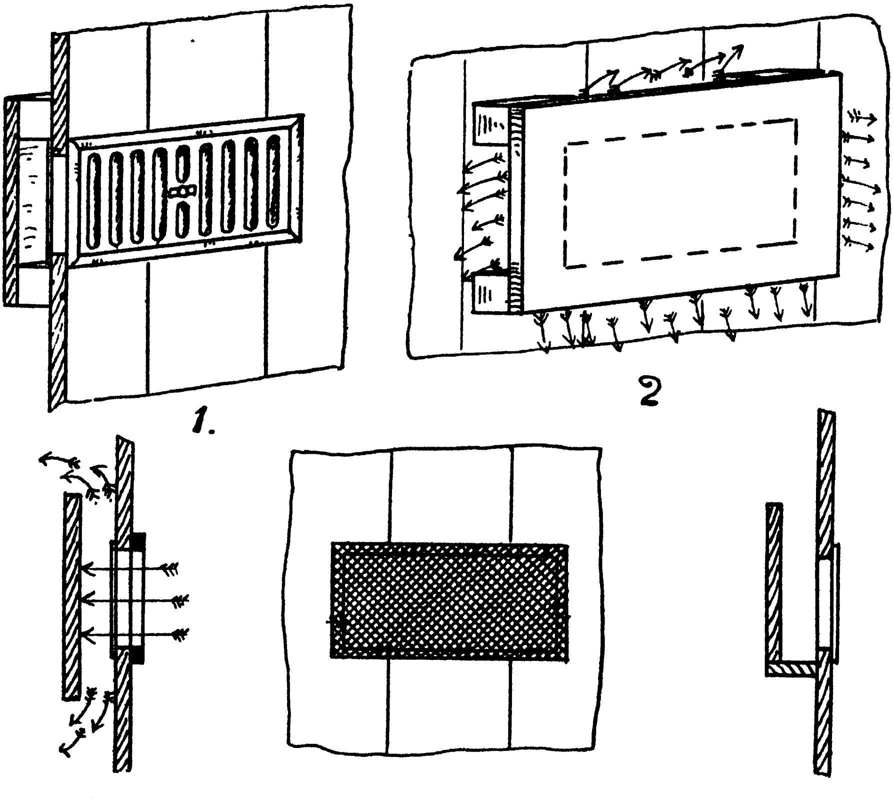
——**THE ROOF.** No form of roof can equal thatch, so far as equality of temperature is concerned, as it is such an excellent non-conductor of heat and cold. The interior of a poultry house with a roof of this description maintains a remarkably even temperature during summer and winter, being cool during the former and warm during the latter seasons. Thatch, however, has serious drawbacks, which render it unsuitable for such a purpose. For one thing, it harbours so many insects and vermin that it is well-nigh impossible to keep the fowls clean. Wood alone is frequently employed, but it does not make a first-class roof. Unless it fits exceptionally well it is not water-tight, and constant worry is caused through the interior of the house becoming damp. A wooden roof can be greatly improved upon by covering with felt, or a substitute described already. For portable houses, this is probably the best form there is, as lightness is so essential a feature in the construction. For permanent houses, corrugated iron, lined with match-boarding ¾ of an inch thick, with a layer of felt between, makes perhaps the best kind it is possible to have. It is by no means expensive, it is warm in winter and cool in summer, and it lasts a long time without requiring any attention whatever. There should be a space of a couple of inches between the felting and the iron, in order to allow a current of air to pass between. The felting should be nailed on to the upper side of the boarding, and thoroughly well tarred.

——**THE FLOOR.** Many poultry-houses, especially permanent ones upon farms, have a cement or brick floor, but neither is a form to be recommended. The former during the winter months is exceedingly cold, and we have never found fowls to thrive quite so well upon it. The coldness can to some extent be overcome by thickly littering with peat moss litter, or earth, but even then it is far from satisfactory. Cement is very hard, frequently causing bumble-foot, a disease affecting the soles of the feet, which sometimes results in a great deal of worry. Bricks, whilst not nearly so cold, are to some extent absorbent, retaining a part of the liquid portion of the manure, and in time preventing the house from smelling sweet and clean. Wood is very often employed, and of the three is the best, but the boards must fit exceedingly well, otherwise the house will prove draughty, besides which dirt will remain in the crevices and cracks. The best kind of floor is the earth itself; it is the cheapest, the most easily removed and the one which maintains the most even temperature. If the situation is a damp one, it is a good plan to raise the interior a few inches with dry earth or gravel, which, well trodden down, forms a very excellent floor. A form of house which has a certain amount of popularity, though not so much as formerly, is one with a floor raised about three feet from the ground, affording a shelter beneath, under which the fowls can go on wet or cold days.

So far as the shelter is concerned, it is a good idea, but a house with a raised floor varies so greatly in temperature. A bank of air beneath the floor of the house makes the interior much colder during the winter and hotter during the summer, besides which such a house is almost certain to be draughty. Upon the floor, of whatever it may consist, there should always be kept a thick layer of litter, consisting of peat moss, earth, ashes, or dried leaves, etc. Of these, the first-mentioned is much superior and is strongly recommended. It is quite cheap, costing about £2 per ton delivered, and a ton goes a very long way. It is a deodorizer and an absorbent, holding the ammonia of the manure in suspension. If the house is not overcrowded, and the litter is six inches deep, it should remain sweet for nearly twelve months, provided it is raked over once every day and forked over once a week. When done with in the house it makes a good manure, but must be sparingly used, as it is practically indestructible and, if applied too generously, speedily makes the land boggy and wet.

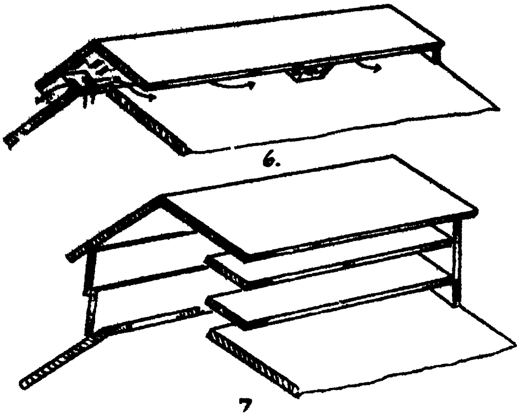
——**DUST BATH.** Whatever kind of poultry house is used—whether movable or otherwise—its tenants should be provided with a dust bath. The dust bath is as essential to the well-being of fowls as food, grit, etc. Besides providing exercise for the birds it keeps them in healthy plumage, and is the only means by which they can cool their feverish bodies or rid themselves of the insects that are ever striving to become their unwelcome guests. To growing fowls a dust bath is particularly essential, as without it the youngsters are sure to be attacked by the red mite, which will suck the very vitality out of their bodies. When young birds are badly attacked a good dusting with insect powder will, as a rule, rid them of the pests for a time, when the operation of applying the powder must again be performed. But the birds will keep themselves entirely free from such parasites if they are supplied with fire ashes or road sweepings, among which has been mixed a little flowers of sulphur. If the poultry house is a movable one and on grass land, it should have a roomy covered box attached to it, and this box should contain a good depth of the dusting material. If the house is a fixture, a dust bath should be provided under the scratching shed by digging a hole in the ground about a foot deep, so that the fowls may resort to it, if they so wish, even in the most inclement weather.

——**VENTILATION.** Generally speaking, insufficient attention is given to the ventilation of fowl houses, either very little or no provision being made for ensuring a constant supply of fresh air, which is so essential to the maintenance of sound robust health amongst the occupants. Not only does a badly-ventilated fowl house tend to weaken the constitution of the fowls, but it also lowers their vitality and makes them more liable to contract contagious diseases. Although plenty of fresh air is desirable, it must be borne in mind that adequate ventilation does not imply draughtiness, which is equally as bad and harmful as deficient ventilation, the ideal to be aimed at being the provision of means which ensure a gentle diffused current of fresh air passing constantly through the building and the removal or extraction of the air that has passed through the lungs of the roosting birds and become foul and vitiated. To properly ventilate a building of any description means that both inlets and outlets must be provided, and, as foul or vitiated air is lighter than fresh air, and rises or is forced to the top, it will readily be seen that the most suitable place to provide means for its escape or extraction is as high as possible in the roof, whilst the inlets for supplying the fresh air to take place of the extracted foul air must be so arranged that the air does not play directly upon the birds, and if possible, both inlets and outlets should be such that they can be opened, closed and regulated according to the amount of ventilation required, more, of course, being necessary in the summer than in the winter. As a rule, cost forms an important consideration in the construction and equipment of a fowl house, therefore the means of ventilation should be as simple and inexpensive as is compatible with efficiency. Some excellent ventilators suitable for fowl houses are illustrated herewith, all of which are of easy construction, cost very little and can be adapted and modified to be applicable to buildings of various types. "Hit and Miss" slide ventilators form very satisfactory fresh-air inlets when fixed in the manner shown in figs. 1, 2 and 3. A hole is cut in the boarding and the "Hit and Miss" air grate fixed on the outside, whilst a piece of perforated zinc is nailed over the hole on the inside, as shown in figs. 1 and 3, and a baffle board also fixed on the inside about two inches away from the perforated zinc, a wooden block being fixed at each corner to secure it in position as shown in figs. 1 and 2. The baffle board should be somewhat larger in size than the perforated zinc or air-grate, a 9 inch by 4 inch hole in the building requiring a board not less than 15 inch by 10 inch, the dotted lines in fig. 2 indicating the relative position and size of the hole to the baffle



Inlet Ventilators for Fowlhouses.

board. The ventilator can, of course, be opened and closed as desired to regulate the supply of air admitted, whilst the perforated zinc prevents the air entering in gusts, the current being broken up into atoms, having to pass through a large number of small holes. The object of the baffle board is to check the speed or velocity of the incoming air, which strikes the board as indicated by the long arrows in fig. 3; it is then diffused, and enters the house gently from all sides of the board as indicated by the arrows in figs. 2 and 3. When it is not desired to go to the expense of providing “Hit and Miss” air-grates the perforated zinc can be fixed over the hole in the boarding on the outside, as fig. 4, and a bottom be formed to the baffle board, as shown in fig. 5, to prevent the air entering in a downward direction, the disadvantage of this form of inlet being that the supply of air can only be regulated by covering up the opening round the baffle board. An inlet of this type should be fixed some eighteen inches or two feet above the perches so that it will be well away from the roosting birds. Raising the ridge of a fowl house a few inches on wooden blocks and leaving a space between the roof boards along the ridge or apex, as shown in fig. 6, forms a very simple outlet ventilator, the foul air escaping in the manner indicated by the arrows. Louvre boards, no doubt, are the best for providing roof ventilation, as they can be opened and closed as found necessary. An illustration of an arrangement of this type is given in fig. 7, one side being closed and the other open. All these ventilators are simple in construction and anyone who is handy with carpenter's tools should have no difficulty in putting them together, the louvre boards, of course, being fixed with pivots at each side to make them open and shut, a cone-headed screw usually making a satisfactory pivot for this purpose.



Outlet Ventilators for Fowlhouses.

——**PERCHES.** Many minor troubles against which all poultry keepers have to contend are often directly or indirectly caused by improper or defective roosting accommodation, and by giving a little thought and attention to the way in which the perches are arranged and fixed in the houses, both loss and worry can be avoided. Over-crowding on the perches is most undesirable, therefore ample roosting accommodation should always be provided, a perching space not less than nine inches long being necessary for each bird, whilst the poles

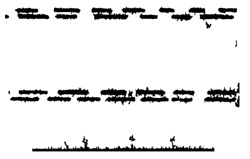
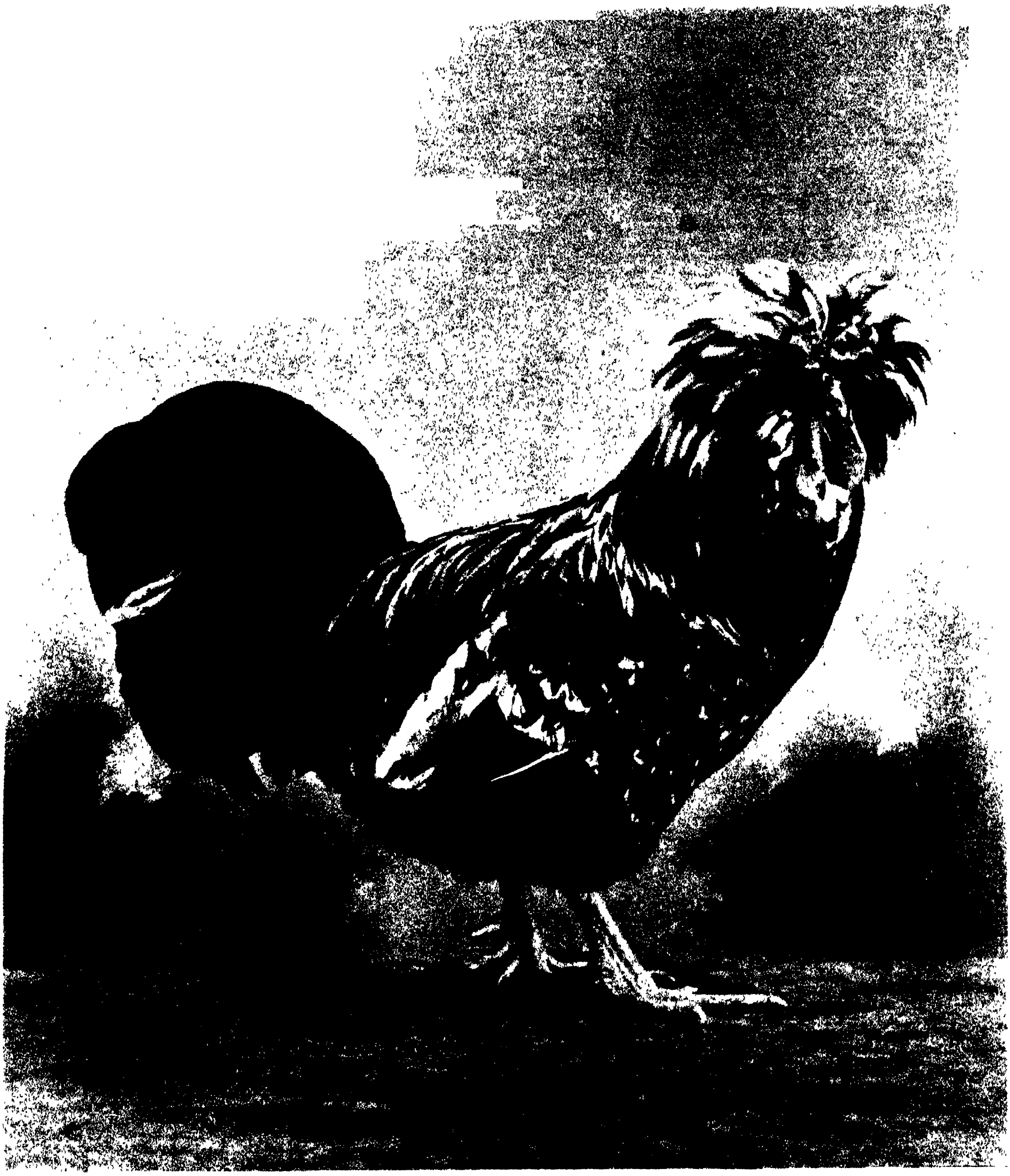


Fig. 1.

PLATE No. 48



Houdan Cock.

(*Bred and exhibited by Mr. Henry Edye, South Binns, Heathfield, Sussex.*)

Winner of 1st Crystal Palace (International), 1904 and 1905; 1st Birmingham, 1904 and 1905; 1st Norwich; 1st Southampton; 1st and Special, Reading; 1st and Special, Tunbridge Wells, 1907 and 1908. Sire of 1st and Silver Medal, Dairy Show, 1906; 1st and 10-Guinea Challenge Cup, Crystal Palace, 1906.

should be arranged in such a way that draughts do not play upon the roosting inmates, the best position usually being out of the direct line of the door, and as far away from it as practicable, as shown in fig. 1 of the accompanying sketches. To arrange the perches along the length of a house of the type shown in fig. 1, in the manner indicated by the dotted lines, means that many of the birds would be compelled to roost in the draught, which invariably arises from the door. Perches fixed at a great height from the floor of the fowl house are a mistake and likely to cause leg weakness, bumble foot, corns, abdominal and straining troubles, and also cut and sore feet in the case of heavy birds, which drop with considerable force when alighting from high perches. Both the class of birds to be accommodated and the size of the house should be taken into consideration when deciding upon the height to fix the perches; three feet high being quite sufficient for lightly built birds in large roomy houses, whilst from eighteen inches to two feet will answer for heavy birds. Although the perches are not infrequently fixed at varying heights, that is, rising from the front to the back in the form of a step ladder, as in fig. 2, it is much better to have them all practically on the same level, in the manner shown in fig. 3, the quarrelling caused by the majority of the birds wishing to roost on the topmost perch thereby being averted. A clear space of some fourteen or fifteen inches should be allowed between the perches, with sufficient room between the back perch and the end of the building to avoid damaging the cock's tail feathers, a width of about nine inches usually being satisfactory. All perches should be easily removable to facilitate cleaning and disinfecting, and be formed of fairly smooth wood about two inches wide and from two to four inches deep, according to the strength necessary to prevent the perches bending when the birds move about on them. Poles or wood with the bark on should not be used for perches, as when the wood dries the bark becomes loose and the hollow space formed between

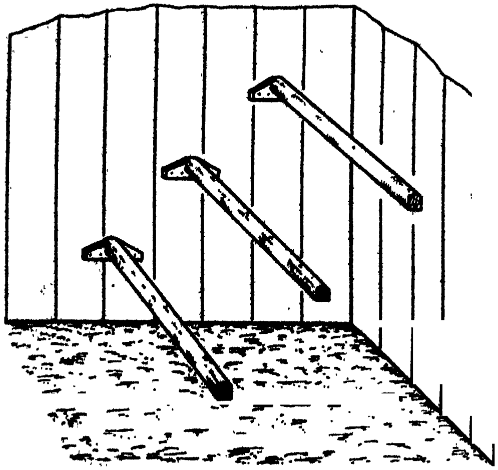


Fig. 2.

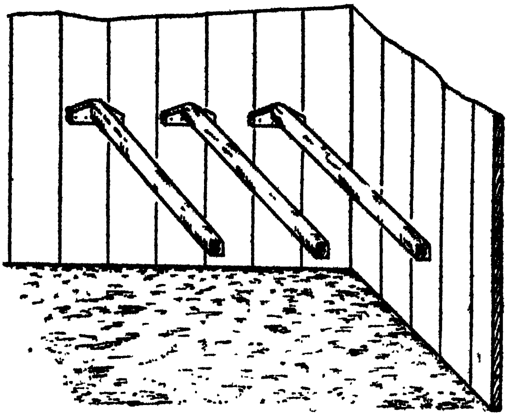


Fig. 3.

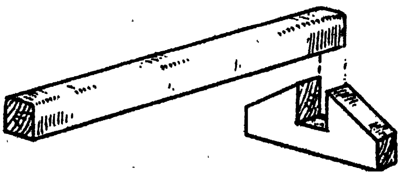
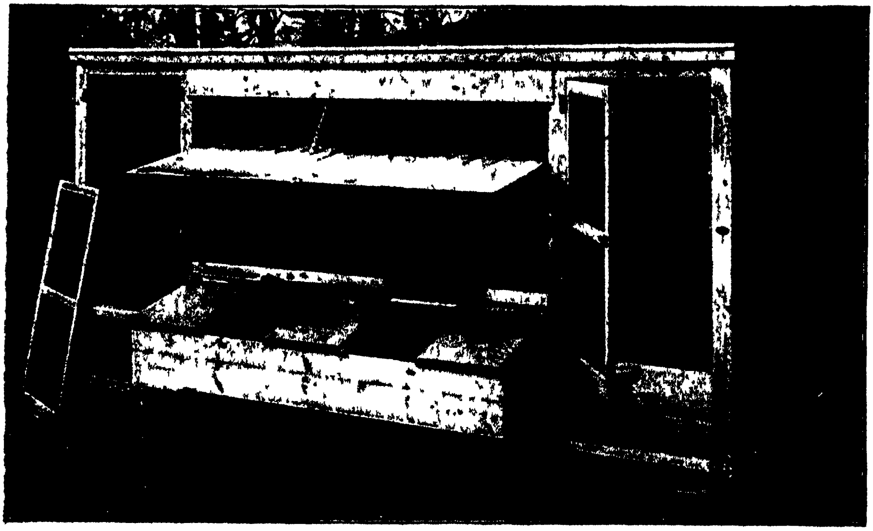


Fig. 4.

provides a safe and snug retreat for thousands of undesirable insects, which cause great discomfort to the fowls during the night. To make the perches removable, wooden sockets shaped as shown in fig. 4 should be nailed to the sides of the building to take the perch ends and hold them in position. The sharp edges on the top side of the perches should be rounded as shown, and all cracks in the wood be filled in with putty, whilst to check and eradicate insect pests the sockets and perch ends should be periodically painted with tar and paraffin, and the perches be frequently scraped and coated with limewash containing paraffin.



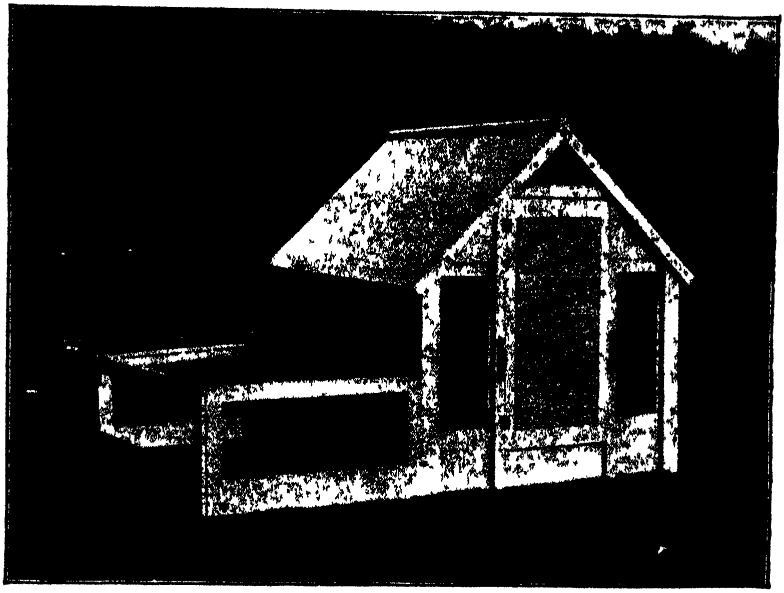
The "U. P. C." House. *(Payne & Co, Newbury)*

——**NEST BOXES.** The most convenient form of nest box is one measuring about fifteen inches square and of a similar height, which allows the birds an abundance of space. Fixed bottoms are not recommended, as they involve greater difficulty in cleaning, and it is a good plan to place the nest boxes on a shelf a few inches wider than they are, in this case dispensing altogether with a bottom. The shelf should be raised eight inches to a foot off the ground, so as to discourage egg-eating and prevent rats from stealing the eggs. Nest boxes can be made at an exceedingly small cost, and if placed against the wall of the poultry house they require no back, while the front remains quite open. All that is required, therefore, are ends and a top, the floor being formed by the shelf. The nests are best placed in the darkest corner of the house where the light will not shine directly on to the birds as they are laying.

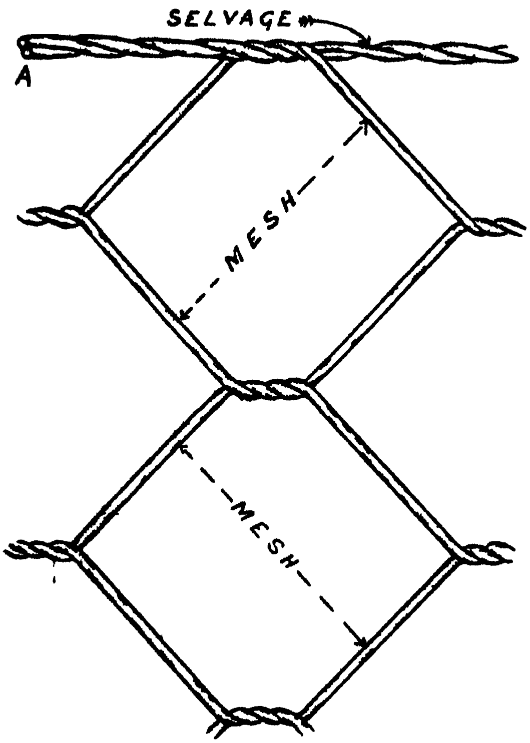
——**IMPORTANCE OF LIGHT.** A very common mistake in the construction of a poultry house—and especially with those of a portable nature—is that they are much too dark, there being but a small window, or else no window at all. Yet it should be borne in mind that light is one of the greatest purifiers we possess, and no place that is always dark can be either thoroughly clean or dry. In all houses there should be a window—the larger, within reason, the better—which should preferably face south or south-east. During the summer this would cause the interior to become very warm, but this is a difficulty which can be very easily overcome by whitewashing the windows, or covering them with sacking or some such material. In this manner the direct rays of the sun will be prevented from entering, keeping the interior cool. It is a good plan to always have the window hinged, so that during the summer months it can remain open, wire netting being substituted to keep the birds within. With open-air houses, the question of a window is not so important; but those that are closed in should always be provided with an abundance of light.

——**SCRATCHING SHEDS.** Attached to the roosting compartment there should be a shelter shed, under which the fowls can go on wet or very cold days. Fowls seem to have a great objection to shelter in their roosting compartments during the day, and it is quite a common sight to see them standing about in the rain and cold rather than enter their sleeping quarters. A shelter can be made for merely a trifling cost, which will very soon be repaid by the added health and productiveness of the fowls. Quite a low shelter answers the purpose admirably, one about four feet or four feet six inches affording ample space. Only two ends and a roof are necessary, as the shelter can be placed against the house, thus providing the back, while the front remains entirely open. A shelter or, as it is generally termed now-a-days, a scratching shed, possesses such manifest advantages that it is unnecessary to go more fully into the matter. If it is to be used as a scratching shed it is better to have it rather higher, so that it can be more easily cleaned out. Moreover, instead of having the front open, it is a good plan to wire-net it so that, when necessary, the birds can be confined therein. During the winter months, when it is difficult to provide the birds with occupation, the floor of the scratching shed should be covered with straw, chaff, or some such litter, and the grain scattered amongst it.

——**RUNS.** One of the advantages to be derived from adopting the portable system of housing is that the necessity for runs is dispensed with, saving a considerable amount of expense and labour. When, however, space is limited, and it is desired to confine the fowls, fencing must be employed, which is best formed of wire-netting fastened to posts driven into the ground. Movable hurdles are occasionally employed, but they are expensive, and require a good deal of keeping in order. For most breeds of fowls fencing six feet high is necessary, but for a few of the heavy varieties four feet six inches or five feet is sufficient.

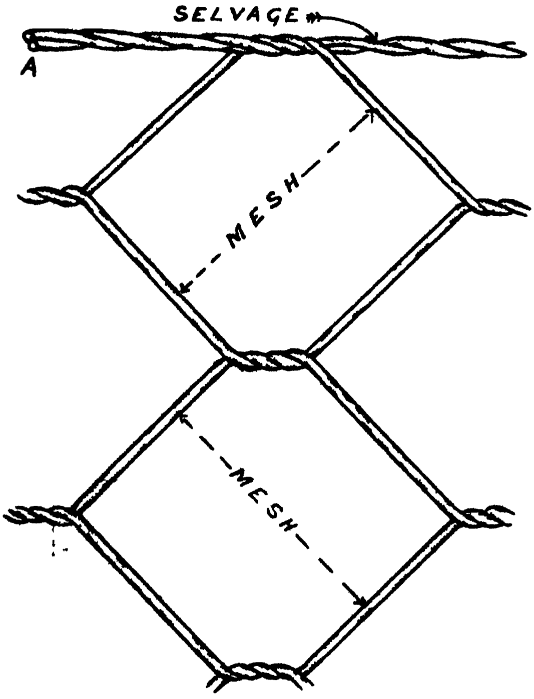


Fresh-Air Poultry House, with Run. (*Payne & Co., Newbury*) that unless a little judgment and discretion are used by purchasers, the kind obtained may turn out to be of very inferior manufacture, be insufficiently strong for the purpose for which it is required and prove a most unsatisfactory investment in every way. When ordering wire-netting the quality known as A1 should always be stipulated together with the gauge of wire, as it is upon this that the strength and resisting power of the netting largely depend, the price also being influenced by the gauge. The term mesh, used in connection with wire-netting, means the space or distance between the wires, as indicated on the accompanying sketch, whilst the selvages are the twisted wires running along and forming the edges of the netting. Two wires are usually employed for each selvage, as shown at A, but in the strongest qualities netting for the use of poultry keepers is made in ten different meshes, ranging from half-inch to three inches, and it should be borne in mind that the larger the mesh the lower should be the number of the gauge of wire employed, the stronger wire, of course, compensating for the loss of strength due to less wire being required. Wire-netting can be obtained in widths varying from twelve inches to six feet, a full roll consisting of fifty lineal yards. Meshes smaller than one inch are not much used by poultry keepers, but come in very useful where protection from rats is necessary. Inch mesh netting is the best for small chickens and where a sparrow proof run or enclosure is wanted, but for general purposes two inch mesh will be found the most satisfactory and economical. The following gauges of wire are recommended for netting for general use, but for situations where rough usage and hard wear are likely to be encountered stronger gauges should be employed. For meshes under one inch gauge, No. 20; for meshes from one inch to one and five-eighths inch gauges, Nos. 17 and 18; and for two and three inch mesh netting gauges, Nos. 16 or 17 and 15, respectively. All wire-netting should be galvanised after manufacture as, in addition to preventing premature decay of the wire, the coating of zinc increases the strength of the netting. By examining the twisted parts of the netting it is quite an easy matter to tell at what stage the coating of zinc was applied. When wire netting six feet high is employed, the posts require to be seven feet six inches long, so that eighteen inches can be underground, which part should have been previously well tarred. They should be pointed at one end, so that they can be driven into the ground—a much easier method than digging holes for them. If a strand of wire is run along the top of the posts, the netting can be pulled considerably



[illegible] labour can frequently be economised. When the runs are placed side by side—which plan saves a good deal of netting—the lower two feet of the division should be boarded, in order to prevent the cocks fighting. Corrugated iron may be used, but it is more expensive, and no more effective, though it lasts a considerably longer time.

——**TAINTED GROUND.** The question of tainted ground is one that has to be seriously considered when fowls are confined in runs, and this is, perhaps, the greatest objection to such a plan. It is possible, however, provided precautions are taken, to keep the ground perfectly pure and sweet, notwithstanding the fact that fowls may be upon it the whole year round. The writer has had a pen of fowls upon the same small piece of land for several years, and yet it is just as free from taint to-day as it was before the run was erected. It is, however, wiser, when possible, to give the run a rest for a few months every year, and the danger of foulness is still further reduced if during this time some quick-growing vegetables are grown thereon. So long as the grass can be kept growing vigorously, the fear of tainted ground is reduced to a minimum ; it is when the grass becomes worn away, and there are bare patches here and there, that the chief danger arises. A run should always, if possible, be long and narrow rather than square, because there is a greater risk of the latter becoming foul. The number of times the fowls go to the further end of a long run are comparatively few, and immediately they find the land around the house losing its freshness they go further away ; whereas, in a square run, they are constantly over the whole of it. The shape of the run is a point to which attention is too seldom paid, but it warrants careful consideration. When it into two parts, placing the house in the middle. One season the fowls have the use of one half, and in the other are planted some quickly-growing vegetables. The order is reversed the following year, and in this manner quite a small piece of ground can maintain a flock of birds for an unlimited number of years. The vegetables have the effect of using up the manure, making the ground absolutely pure by the following year. It is always a good plan, whether the fowls are in the run continuously or not, to plant fruit trees or bushes, as not only does this assist in removing the manure, but the trees thrive remarkably well, bearing excellent crops. If the run becomes foul, it is a good plan to water with a one per cent. solution of sulphuric acid, or to apply a light dressing of gas lime. The question is often asked as to what amount of space is necessary in the run for a certain number of birds, but, like many other questions, it is impossible to answer satisfactorily by giving any stated number. It depends upon so many circumstances that to give a definite answer without knowing particulars concerning the breed, the nature of the soil and the time of year would be most misleading, and perhaps altogether erroneous. Some breeds are more active than others, and thus require more space, while the different classes of soil also determine the numbers. A light, sandy soil, for instance, remains sweet much longer than one consisting of clay, because in the former case the greater part of the manure is washed straight away. During the growing periods of the year, too, the land can be more heavily stocked than during the winter or autumn months. The only thing to do in this connection is to carefully observe the soil and vegetation, and, as soon as any indications of tainted soil appear, reduce the number ; or if, on the other hand, the growth is becoming too coarse, increase the number



Galvanised wire-netting is made in many qualities and strengths, so many, in fact, that unless a little judgment and discretion are used by purchasers, the kind obtained may turn out to be of very inferior manufacture, be insufficiently strong for the purpose for which it is required and prove a most unsatisfactory investment in every way. When ordering wire-netting the quality known as A1 should always be stipulated together with the gauge of wire, as it is upon this that the strength and resisting power of the netting largely depend, the price also being influenced by the gauge. The term mesh, used in connection with wire-netting, means the space or distance between the wires, as indicated on the accompanying sketch, whilst the selvages are the twisted wires running along and forming the edges of the netting. Two wires are usually employed for each selvage, as shown at A, but in the strongest qualities of large mesh netting, three wires are used, known as three-ply selvages. Wire-netting for the use of poultry keepers is made in ten different meshes, varying from half-inch to three inches, and it should be borne in mind that the larger the mesh the lower should be the number of the gauge of wire employed, the stronger wire, of course, compensating for the loss of strength due to less wire being required. Wire-netting can be obtained in widths varying from twelve inches to six feet, a full roll consisting of fifty lineal yards. Meshes smaller than one inch are not much used by poultry keepers, but come in very useful where protection from rats is necessary. Inch mesh netting is the best for small chickens and where a sparrow proof run or enclosure is wanted, but for general purposes two inch mesh will be found the most satisfactory and economical. The following gauges of wire are recommended for netting for general use, but for situations where rough usage and hard wear are likely to be encountered stronger gauges should be employed. For meshes under one inch gauge, No. 20; for meshes from one inch to one and five-eighths inch gauges, Nos. 17 and 18; and for two and three inch mesh netting gauges, Nos. 16 or 17 and 15, respectively. All wire-netting should be galvanised after manufacture as, in addition to preventing premature decay of the wire, the coating of zinc increases the strength of the netting. By examining the twisted parts of the netting it is quite an easy matter to tell at what stage the coating of zinc was applied. When wire netting six feet high is employed, the posts require to be seven feet six inches long, so that eighteen inches can be underground, which part should have been previously well tarred. They should be pointed at one end, so that they can be driven into the ground—a much easier method than digging holes for them. If a strand of wire is run along the top of the posts, the netting can be pulled considerably tighter, besides which there is less fear of its sagging. Plenty of gates should be provided in the runs, as in this manner so much labour can frequently be economised. When the runs are placed side by side—which plan saves a good deal of netting—the lower two feet of the division should be boarded, in order to prevent the cocks fighting. Corrugated iron may be used, but it is more expensive, and no more effective, though it lasts a considerably longer time.

——**TAINTED GROUND.** The question of tainted ground is one that has to be seriously considered when fowls are confined in runs, and this is, perhaps, the greatest objection to such a plan. It is possible, however, provided precautions are taken, to keep the ground perfectly pure and sweet, notwithstanding the fact that fowls may be upon it the whole year round. The writer has had a pen of fowls upon the same small piece of land for several years, and yet it is just as free from taint to-day as it was before the run was erected. It is, however, wiser, when possible, to give the run a rest for a few months every year, and the danger of foulness is still further reduced if during this time some quick-growing vegetables are grown thereon. So long as the grass can be kept growing vigorously, the fear of tainted ground is reduced to a minimum ; it is when the grass becomes worn away, and there are bare patches here and there, that the chief danger arises. A run should always, if possible, be long and narrow rather than square, because there is a greater risk of the latter becoming foul. The number of times the fowls go to the further end of a long run are comparatively few, and immediately they find the land around the house losing its freshness they go further away ; whereas, in a square run, they are constantly over the whole of it. The shape of the run is a point to which attention is too seldom paid, but it warrants careful consideration. When the piece of land available for the fowls is quite small, it is a good plan to divide it into two parts, placing the house in the middle. One season the fowls have the use of one half, and in the other are planted some quickly-growing vegetables. The order is reversed the following year, and in this manner quite a small piece of ground can maintain a flock of birds for an unlimited number of years. The vegetables have the effect of using up the manure, making the ground absolutely pure by the following year. It is always a good plan, whether the fowls are in the run continuously or not, to plant fruit trees or bushes, as not only does this assist in removing the manure, but the trees thrive remarkably well, bearing excellent crops. If the run becomes foul, it is a good plan to water with a one per cent. solution of sulphuric acid, or to apply a light dressing of gas lime. The question is often asked as to what amount of space is necessary in the run for a certain number of birds, but, like many other questions, it is impossible to answer satisfactorily by giving any stated number. It depends upon so many circumstances that to give a definite answer without knowing particulars concerning the breed, the nature of the soil and the time of year would be most misleading, and perhaps altogether erroneous. Some breeds are more active than others, and thus require more space, while the different classes of soil also determine the numbers. A light, sandy soil, for instance, remains sweet much longer than one consisting of clay, because in the former case the greater part of the manure is washed straight away. During the growing periods of the year, too, the land can be more heavily stocked than during the winter or autumn months. The only thing to do in this connection is to carefully observe the soil and vegetation, and, as soon as any indications of tainted soil appear, reduce the number ; or if, on the other hand, the growth is becoming too coarse, increase the number proportionately. When poultry are housed in portable houses scattered about the fields, runs are very rarely employed, but, while they are not necessary, they are a great boon, saving a considerable amount of labour and allowing the fowls to enjoy several hours more of sunshine. The run must only be quite small, so that it can be easily lifted from one place to another, as it would involve too much labour to have to take it to pieces every time the house was moved—that is to say, two or three times a week. For an ordinary-sized portable house, the run need not be more than six or eight feet square. If the house were a stationary one, this would, of course, be insufficient, but, as it is constantly moved, the ground has no time to become tainted. The run should be made of two inch by two inch quartering, with two inch mesh wire-netting; and in order to effectually confine the birds, it should be five or six feet high. It can be fastened to the house with hooks, so that it is but the work of a moment to remove it whenever necessary. The advantages of a small confined space adjoining the house are many. In the first place it very considerably reduces labour, as when the fowls are fed in the afternoon the food can be thrown in the run, the door closed and then they are ready for the night. This saves the bother of someone having to go round the last thing to shut the fowls into their house, which, when the sheds are scattered about the farm, is by no means an easy task. The fowls, moreover, are able to get out at what time they like in the mornings, whereby, during the summer months, they are enabled to enjoy several hours' more sunshine, as probably they come out at daylight, whereas otherwise they would have to wait till 6.30 or seven o'clock. Another advantage which runs possess is that they are so effectual a safeguard against foxes. In some parts of the country this is a matter of greater importance than in others, as foxes are very numerous in certain districts. One of the most dangerous times of the day is when darkness is setting in, and it is then that the bulk of the chickens lost in this way are stolen by the foxes. If the birds are safely confined in a run they are still enjoying the fresh air and daylight, but are quite safe from this class of vermin.

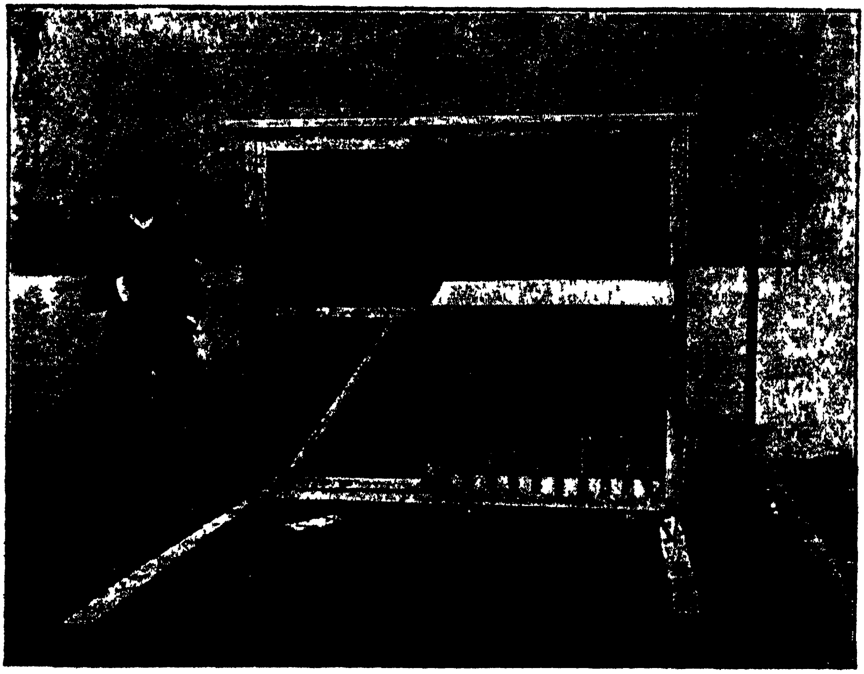
——**GATES AND DOORS.** The mistake is often made, through a false sense of economy, of having as few gates as possible; but a little extra expense is well incurred in providing a gate or door wherever necessary. Much time may be lost through an insufficient number, as it occasions so much unnecessary walking. Before a house and run is erected a rough plan should always be drawn, as in this manner it can be seen at a glance where the gates will be most convenient. In the runs wire-netting gates answer the purpose admirably, and if between two runs, the lower part should, as already stated, be boarded in order to prevent the birds fighting with one another. The gates or doors should be hung a few inches above the ground, so as not to drag when being opened, which speedily weakens them and is apt to wrench off the hinges. Catches should be used that can be opened from either side.

——**PRESERVATION OF PLANT.** Poultry houses, hen coops, chicken runs, etc., are almost entirely constructed of wood—a material which requires protection against the influence of weather. Without preservatives it becomes saturated with moisture, rots, cracks and rapidly depreciates in usefulness and value. Properly cared for, painted, tarred, or otherwise protected, the appliances may be made to do duty for the proverbial "life-time." In the first place, all appliances should be properly coated when new. If well made, of planed seasoned wood, nothing is perhaps better and more pleasing than ordinary oil paint, of any colour or tint that the poultry keeper may fancy.

This any amateur is well able to apply. The wood should be perfectly dry and free from grease and the paint—purchaseable at the rate of 4½d. per pound—applied with a good brush in even, thin coats. The brush should be plied in one direction only, up and down or from side to side; preferably with the grain of the wood, and the paint will spread. If applied too thickly it will take some considerable time to dry, will wrinkle and look and wear unsatisfactorily. When the first coat has dried, a second coat should be applied and then a third. Three coats of paint are essential for new wood, and four are much to be preferred. It is necessary to bear in mind that the main object of paint is to preserve the wood rather than to ornament it. If the trouble and expense of painting are objected to, and the time occupied is certainly a consideration when many appliances have to be dealt with, excellent results may also be obtained by using such preparations as *Carbolineum* or *Solignum.* These are combined stains and preservatives and may be procured in various shades of brown and green. They may be applied with an ordinary brush, care being taken that the stain is well rubbed into cracks and crevices, and a sufficient quantity applied to allow of its soaking into the wood, which, of course, must be perfectly dry. Two coats should be given for the best results. For appliances made of unplaned boards and of rough wood, such as is frequently employed by amateur carpenters, the best preservative is, perhaps, tar; either the ordinary black *coal tar* or that known as *Stockholm tar,* which is superior in appearance and only slightly more expensive. Two coats should be given with a tar brush, procurable at any oil shop, the tar being applied hot, so as to facilitate spreading and increase its penetrative power. What has hitherto been said applies to new houses and appliances. Old ones which have seen work and wear should be periodically examined and repaired where necessary before defects have become considerable. This is especially desirable towards the close of the summer, and before the advent of rainy, stormy weather. At such times leaks should be repaired and the houses, etc., given a coat of paint, stain or tar. The roofs should receive particular attention. Where, as is frequently the case, roofing felt has been made use of, all loose lengths must be tacked down and the whole roof given a coat of hot tar, on which sand should be sprinkled before it has dried. The interior of all sheds and houses, etc., are best limewashed, and this should be done at least twice a year, when they are in constant use. The lime cleans, disinfects and destroys vermin. A good limewash is made as follows: Slake half a bushel of fresh lime with water in a tub, covering it during the process to keep in the steam. Then strain the liquid through a fine strainer to remove all coarse particles, and mix with it a peck of salt previously dissolved in a little warm water; also three pounds of ground rice boiled to a thin paste. Add five gallons of clean water to the mixture, stir well and allow to stand covered for a day or two. A little thin glue or grease may take the place of the ground rice paste, the object of which is to prevent the lime from flaking off when dry. The wash should be applied hot. About one pint will be required for each square yard of surface to be limewashed, and this will enable the user to judge as to the quantity of limewash which it will be necessary for him to prepare.

HOUSING. The average poultry keeper of bygone days, although providing a house for his birds, either overcrowded it, or under-ventilated it, with the result that its inmates had to be periodically dosed for roup and kindred ills. A great advance has been made in the housing of poultry since those days, when hygiene was seldom or never thought of.

Twenty years ago, it was considered advisable to keep the poultry house as warm as possible during the winter months, and to achieve this object very little ventilation was allowed. But the American poultry keepers some years ago began to ridicule the idea of those who advocated warmth for fowls. They took a lesson from Nature—the haunts of the wild pheasant and other birds—and cried out for more fresh air for their fowls, and the makers of poultry houses responded to the cry in the form of open fronted shelters, which upset many old ideas concerning poultry housing, by keeping the fowls in better health and better lay. The " fresh air " cry was taken up in this country with the result that to-day thousands are proving that the more fresh air the fowls can be allowed, so long as draught is avoided, the higher will be their standard of health. The open-fronted shelter has been touched upon to prove that it is well-nigh impossible to overdo the air supply, even during the winter months. Although in America the climatic conditions are in many parts much colder than any experienced here, the birds confined to the open-fronted shelter keep in perfect health, therefore, the idea that cold is harmful to fowls should be ignored. Cold air does no harm to fowls, indeed, judging from the splendid health enjoyed by fowls that are allowed to roost at large in trees, even during the winter nights, one might conclude that such was beneficial to them, and the choice might well be given to a tree in preference to many ill-ventilated houses, erected by some for the sheltering of poultry. During fine days the doors, windows, and other means of ventilation should be left open to their fullest extent, so that the air may thoroughly sweeten the interior of the house, and also that the sunlight may find access to all parts of the structure. Sunlight is a wonderful factor in the extinction of disease germs; they cannot exist under its influence, therefore such a valuable agent should be allowed to enter the house on all fine days.



A Fresh Air Poultry House.

Constructed with a view to providing the maximum amount of light and air without draughts In winter the wire door has a canvas covering The perches are placed just above the nest boxes shown in the picture, thus allowing ample scratching accommodation

OVERCROWDING the poultry house is equivalent to an insufficiency of ventilation. It is one of the major evils that exist in the mismanaged poultry yard, and has been responsible for more failures on the poultry farm than anything else. Fortunately for the poultry industry, the practice of roosting a hundred or more fowls in one house is rapidly dying out, as it has been proved over and over again that smaller flocks not only give a better return in eggs, but the breaking out of disease can be quickly detected, and the affected birds speedily isolated. It only requires one diseased fowl to drink from the water vessel to convey its disease to the whole of the flock. When a hundred or more birds are housed together, it is a very easy matter for some individual bird to spread disaster before it can be isolated. Then again, the food supplied to large flocks cannot be properly balanced. At feeding time there is a general hustle among the birds to get at the food. The strongest gorge themselves, with the result that they become over fat, and therefore, unprolific, whilst the others are driven off the food and are rendered too weak to lay. The housing space, in conjunction with adequate means of ventilation that should be allowed for each fowl is ten cubic feet; if a little more space per bird can be allowed, so much the better, as, for instance, during the hot nights experienced in the summer months, unless adequate means of ventilation are provided, the atmosphere becomes almost unbearable to the fowls, owing to the fact that it hangs about the house and loses much of its life-giving oxygen. The cubic capacity of the poultry house may be obtained by multiplying length by breadth by height, thus, a house 6 ft. by 6 ft. by 6 ft. contains 216 cubic feet of air space, and will, therefore, safely shelter twenty-one birds. In excessively cold weather, fowls may with safety be confined to less space than that referred to above. The best test as to the comfort of the birds can be made by entering the house at night and staying inside ten minutes with the door closed. If at the end of that time the air becomes uncomfortably warm and foul, more ventilation is required, and should there be no means in the way of ventilators to increase the fresh air supply, the number of fowls in the house should be reduced. There must be no suspicion of stuffiness in the house. As ten cubic feet of air space has been recommended for each bird, it may be thought that the initial cost of housing poultry on a large scale must be high. It may, at first sight, seem high, but experience has taught over and over again that the extra cost of housing is more than compensated for by the maintenance of health in the birds, and consequently the extra number of eggs produced. It is now a recognised fact in the world of poultry culture that the smaller the flock of fowls run together and sheltered in one house, the greater will be the profit derived.

——**CLEANLINESS** should be one of the chief things aimed at in the management of the poultry house. The attendant should be of an observant disposition. He should enter the house each morning and remove from the perch boards or floor all droppings that have accumulated during the night. Such work should not be neglected for a single day. It is next to useless studying proper ventilation unless the interior of the house is kept free from the accumulation of filth. Perch boards, if such are used, should be scraped free of droppings each morning and afterwards dusted with slaked lime or carbolic powder, on the top of which should be sprinkled sand or fine ashes to prevent the excrements from adhering to the wood. An old garden hoe with its handle shortened to about 18 inches makes a capital tool for the cleaning of wooden floors and perch boards of poultry houses. A similar article with its handle unshortened may be used for scraping such floors as are composed of earth. Should the house used be what is known as the "scratching shelter" type, that is, a structure in which the fowls roost at night and find employment during the daytime scratching among litter of some kind thickly laid upon its floor, the materials used as litter should be paid attention to the moment an unpleasant odour arises therefrom. Slaked lime should be freely sprinkled among the litter and raked in so that fowls may safely roost above it. The combination roosting house and scratching shed has somewhat diminished in favour of late. The generality of poultry keepers who adopt scratching sheds prefer to have such sheds built separately from the house, and no doubt such an arrangement is good, as the latter can be kept more easily within the rules of hygiene. Just a word respecting the cleaning of poultry houses devoid of floors, and which are moved about meadow lands in fine weather for the purpose of distributing the droppings. Should a long spell of wet weather prevail, it is not advisable to move the houses to damp ground, but an accumulation of droppings must not be allowed to take place under the perches or the fowls will suffer in health. The excrements beneath the perches should be occasionally removed, and the ground sprinkled with slaked lime. Once a month at least all the inside fittings of the poultry house should be taken out, thoroughly cleaned and dressed with crude petroleum to keep down insect pests. Lice hide away in the crevices formed by the fittings, and that is why the fittings should be removable for cleansing purposes. Should the fittings be immovable, all corners and crevices formed by such must be got at by the aid of a syringe charged with petroleum, or carbolic acid solution. Lice hide away during the daytime and at night they leave their haunts and make for the fowls *via* the roosts, therefore the roosts should be paid special attention to, receiving periodical dressings with some reliable insect destroyer. Nesting materials should be removed at least once a month, and the floors of the nest boxes well dusted with slaked lime, after which fresh clean straw or bracken leaves should be formed into new nests. Nest boxes, if neglected in regard to cleanliness, are just the places where hen lice soon congregate; such appliances should therefore be frequently overhauled. Bracken fern leaves, well dried and clean oat straw make good nesting materials. Hay should not be used as, unless it can be changed very frequently, it soon becomes musty. At least twice a year, the interior of the house should receive a good coating of limewash. (*See* "Houses.") Before limewashing, it is a good plan, if at all convenient, to isolate the fowls and to fumigate the house with sulphur. This will kill every insect within reach.

Spray Pump for Limewashing Poultry Houses.
(*W Tamlin*)

Before fumigating, of course, all windows and ventilators must be made as air-tight as possible to prevent the escape of the sulphur fumes. In the housing of poultry, due regard must be paid to the prevention of draught and dampness. Expansion and contraction of the boards forming the walls of the house are caused by hot sunshine and rain playing alternately upon them. So great is the strain put on the boards at times that many of them split, and cracks are formed, and such cracks, if anywhere near the perches, are liable to cause dangerous air currents to play upon the fowls and give them colds or roup. During spells of hot weather, poultry houses should be inspected, and should any cracks be found the same should be speedily repaired.

——**DAMP** may be caused either by a faulty roof or the accumulation of moisture in the earth at the base of the house. The former cause can be remedied by paying strict attention to it with the aid of the saw, hammer and tar brush. The latter should be got rid of by shifting the house to a drier situation. The site chosen for a permanent poultry house should be on elevated ground, if such can be obtained, so that heavy rains may not reach it. On no account must moisture be allowed to find a way under the wooden floor, or it will speedily rot the timber. Neither must moisture be allowed to percolate to the earth forming the floor of the house. There is nothing more dangerous to the health of fowls than to allow them to roost above a damp floor. The following has been found a good plan to adopt for keeping the base of the poultry house dry. Erect the house on bricks or blocks of stone about 4 inches thick, placed at the corners of the structure. Before erection, the house should have its lower edges and walls well tarred 6 or 8 inches up. This is absolutely necessary, for it is the lower parts of the structure that are quickly ill-affected by damp striking up from the earth. When the house is erected, each brick or stone on which it stands should be flush with the inner side of the walls. Four stout boards should next be procured, 6 or 8 inches in width, two for the front and back of the house and two for the ends. These should be well coated with tar and then nailed round the lower parts of the house inside, when it will be seen that the house stands off the ground several inches. If anything rots with damp, it will only be the boards, which can be replaced at any time at a small outlay. A load of fine ashes should next be procured and placed in the house to a depth of at least 4 inches and well beaten down to form a level surface. The ground floor of the structure will stand above the outside ground level, and it will be well-nigh impossible for damp to enter the house from that direction. It is a good plan to form, by means of the spade, a gutter all round the outside of the house, and a few inches therefrom, and especially should this plan be adopted in the case of houses with wooden floors to prevent heavy rains finding their way under and rotting them.

——**GENERAL RULES.** The following rules here appended for ready reference should be observed in the housing of poultry :—

Not less than 10 cubic feet of air space per bird should be allowed.

The house should be ventilated as freely as possible so long as draught is avoided.

The interior of the house should be kept as free as possible from the accumulation of excrements and other dirt.

Inside fittings should be overhauled and periodically dressed with insecticide of some kind to keep down lice.

The interior of the house must be kept as dry as possible.

Slaked lime should be used freely about the house.

The inside of the house should be lime-washed at least twice a year.

After limewashing, the house should become thoroughly dry before fowls are allowed to roost in it.

The chief items for the attendant to observe should be cleanliness, dryness, and an abundance of fresh air.

HOVER. A part of a brooder (*see* "Rearing, artificial.")

HYBRID. The term applied to the offspring of different, but generally nearly allied, species (*see* "Origin.")

HYGIENE (*see* "Housing.")

IMPORTS (POULTRY AND EGGS). The declared value of the poultry imported in 1907 was £903,847 and that of game, £150,086. It is the merest guess-work, but if we suppose that 2/- each would be the value, then the numbers would be 9,038,470 head, against 4,100,940 in 1887, a very large increase, perhaps, in twenty years, but still a total which need by no means alarm the home producer, especially when we see that in 1903 and 1904, the values were about £200,000 more than they were last year, and that it might be argued that the imports are actually decreasing after reaching their maximum in 1904. Imports of rabbits are far more serious than those of poultry, and their ratio of increase has been much greater, while their extreme cheapness has doubtless had a large share in keeping down the price of poultry. In the year 1887, we received 117,168 cwts. of rabbits and in twenty years this quantity has been multiplied six-fold, reaching the enormous total of 692,923 cwts. in 1907. Though rabbits are not poultry, the trade in both articles runs in nearly related grooves, and the cheapness of one must have some effect on the other. Nearly the whole of this huge supply comes from Australia and it is easy to see that had it not been for the unwilling production of this article in that country, the industry of rabbit farming, both wild and tame, would have been a very profitable one in this country.

Russia sends us a very large portion of our imported supply of poultry, frozen hard and tightly packed in cases, also several varieties of game, but the United States and Canada also do a considerable business with us in this way. Chicago, that busy and enterprising centre of traffic in cheap food, sends large consignments of chickens, and they arrive well classified and with a good appearance. The Canadians are doing better in this respect, but there is still room for improvement. Experimental lots have arrived from Australasia and sold at fair prices in the London markets. Though a negligible quantity at present, supplies from the Antipodes may become an important feature in future years.

So far, however, we cannot see that this trade in foreign frozen poultry militates very seriously against the profits of English production. Being frozen the birds can be kept an unlimited time in storage, and are chiefly placed on the market at the time of year when home supplies are practically non-existent. They are, of course, always obtainable, but are mostly sold during the first three months of the year, when there is a good demand, and the best of them make very respectable prices. Fortunately for British poultry farmers, freezing—the only mode of preservation as yet available—so deteriorates the flavour and quality of the meat, that poultry so treated is placed in quite a different category, as regards value, to our own fresh-killed produce, but there is reason for expecting in the not distant future, the advent of a new process called sterilization. It is claimed for this discovery, which is, up to the present time, only in the experimental stage, that all perishable goods, including poultry, so treated, will keep six weeks in perfect condition and retain all the flavour of fresh-killed. (*See* "Egg Preserving—Sterilization.")

Of far more importance is the competition of the continent of Europe in fresh poultry, turkeys, of course, heading the list of varieties which, at certain times, flood our markets with birds that leave little to be desired for quality. The Central Market at Smithfield, Leadenhall, and the great provincial markets are often glutted with turkeys from many European countries, notably from France, Italy, Russia, Austria and the Balkan States. It is true that the majority of the public prefer the English, but not sufficiently so to tempt them to pay a higher price, and so the vast bulk of those who buy turkeys at Christmas content themselves with a foreigner, very few people troubling to ask as to its origin. The trade, however, is a very uncertain one for the importers, for it sometimes happens that they send far too many for the great festival, and not infrequently, the weather is mild and damp, causing wholesale losses. Then comes the turn of the British breeder, near at hand, who can send in fresh-killed birds and obtain good prices. On the whole, these foreign turkeys are a great boon to the middle-class families of this country, for many thousands who now purchase them would, in their absence, never taste the royal bird. It is doubtful, even if the foreign supplies were cut off, whether the pursuit of turkey raising in England would greatly increase. They are too troublesome to breed, rear and feed for the British farmer, and supposing the home stocks were doubled, the supply would still be too small for them to be within the reach of any but the wealthy classes. Only a few would, therefore, benefit by any change—fiscal or otherwise—which stopped or diminished the supply of foreign turkeys at Christmas, and, in the interest of the many we must welcome them as a cheap, yet much valued addition to the nation's bill of fare at that season.

We must admit, however, that we view the large number of geese and ducks which enter our ports with different eyes. Our climate and abundant water-courses make England a most suitable home for aquatic poultry, of which all we require might easily be produced at home.

We have already hinted that foreign competition in eggs is a far more serious matter than in poultry, the money value being seven times greater. The figures for 1907 were just over one million sterling for poultry and game, and seven millions for eggs. The total number received in that year was 2,228,148 *thousands*. Looking back twenty years, we find that the number in 1887 was 1,090,089 *thousands*, so that in that short time the importations have more than doubled. The only crumb of comfort to the home producer, who may be staggered by these stupendous totals and alarmed at their rapid increase, is to be found in a closer examination of the figures year by year, during this period. For seventeen years, the growth of supplies was steady and constant, till in 1904, the maximum of 2,393,111 *thousands* was reached, that year being the same in which the importations of poultry also reached their highest point. For the last four years there has been—with the exception of a slight rally in 1906—a gradual decline till last year, the numbers had fallen off by 164,963 *thousands*.

Seeing that there has been no visible decrease in the average price of eggs in this country, it might be supposed that the increase of our population has kept pace with that of these importations, but such an inference is shown to be untenable, when we enquire as to the comparative number of eggs received during the same period per head of the population. In 1887, thirty eggs entered our ports for every person in these islands. Since then the proportion has fluctuated, one year more and another less, but on the whole gradually increased till in 1903 it reached the maximum of 56 per head, declining thenceforward to 51 in 1907. It is clear, therefore, that the British people must have very largely increased their individual consumption, incited thereto by the cheaper grades of eggs placed on their markets, but not, indeed, by those coming from France and Denmark, which usually command about the same price as English and often more than the Irish. Far lower-priced eggs than these come from Russia, Austria-Hungary, Egypt and even far-away Canada. It does not appear, therefore, that the importations from our two near neighbours have done more than keep English eggs from advancing, while the cheaper (and, of course, staler) eggs from more distant countries have not affected the value of our own at all. They have attracted a class of customers, who, without them would never have used eggs.

We will now glance at the facts at our disposal, which deal with the relative supplies from those countries which are regular senders of eggs to this country. Russia is by far the largest sender and her supplies are steadily increasing. In 1903, she exported 816,332 *thousands* and 861,473 *thousands* in 1907. Her greatest year was 1905, when the total reached 914,687 *thousands.* The next, in point of numbers, is Denmark, being 462,187 *thousands* in 1903, and, varying but little in the meantime, showed the small decrease of 6,000 *thousands* in 1907. Then follows Germany, whose highest point was reached for the last five years in 1904, when the numbers were 426,508 *thousands*, decreased in 1907 to 338,535 *thousands*, which is something like 25 per cent. falling off. Belgium is a large sender according to the official returns, which give 256,033 *thousands* for last year, having decreased about 18,000 *thousands* since 1903. As our markets always have Austrian eggs in large numbers, and yet the returns record no imports for the last four years, there is little doubt that most of those credited to Belgium are of Austrian or Hungarian origin, but being shipped from Belgian ports are returned as Belgian goods. The records of several of our imported articles suffer from this defect, which is, we must suppose, unavoidable. France is another country whose exports of eggs are decreasing. This is a fact of great importance, as it has a direct bearing on the severity of that foreign competition which affects the value of English. France is near to us, the means of transit are rapid, and eggs from that country can pass as "new-laid." She was sending us 192,232 *thousands* five years ago, but in 1907, this total fell to 147,853 *thousands.* At certain times of the year scarcely any eggs come from France, the demand for home consumption is rapidly increasing and it is very probable that the supply from that source will be very small in years to come. The Egyptian supply has fallen during the five years from 81,441 *thousands* to 59,915 *thousands*, and the number from Morocco fell during the same period from 56,396 *thousands* to 25,248 *thousands.* The United States never sent us very many, but in five years they have gone down from 19,370 *thousands* in 1903 to 2,875 *thousands* in 1907. There are several other foreign countries which send us eggs, but none of them in considerable quantities and most of them are decreasing. Sweden is an exception and her exports have risen from 5,561 *thousands* to over 20,000 *thousands.* Turkey is also increasing her small exports to us. All the foregoing are foreign countries. Our Colonies do very little indeed with us in eggs. From the whole of them together we are only getting 16,374 *thousands*, about one-fourth of those coming five years ago.

IN-BREEDING. The mating of closely-related birds (*see* "Breeding.")

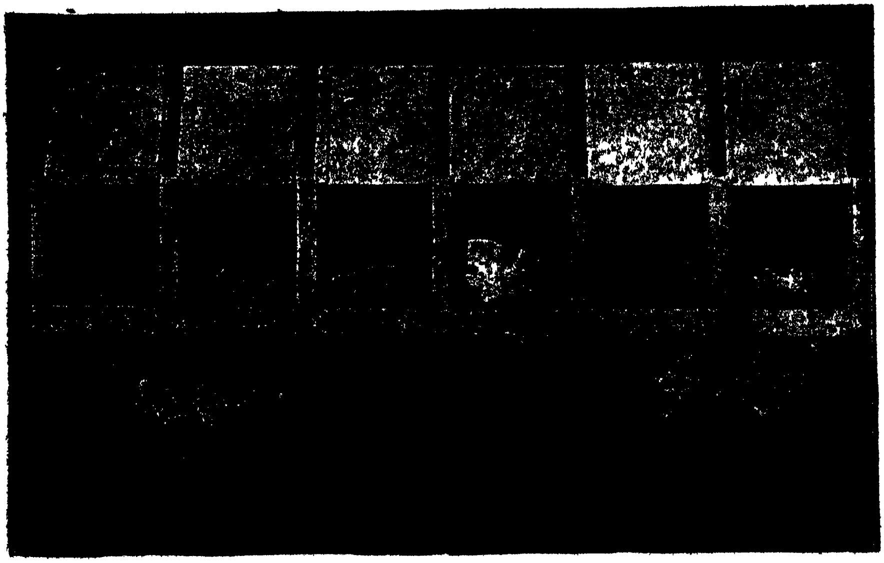
INCUBATING PERIODS. The average period of natural incubation for the eggs of the common hen is a little over twenty, or about twenty-one, days. This period may be somewhat shortened or prolonged by variations in the conduct of the sitting hen, and possibly by changes in the weather. Should the weather be moderate and the hen quiet and faithful, the eggs are not infrequently all hatched by the close of the twentieth or even the nineteenth day. Again, if the weather be extreme and the hen restless and neglectful, the eggs may not all hatch until the close of the twenty-first or the beginning of the twenty-second day. The same applies to eggs of other fowls, except, of course, that each has its own period of incubation, subject to the variations mentioned. The following table is generally accepted and is approximately correct :—

Hen (common)	21 days.
Pheasant	25 days.
Duck (common)	28 days.
Peafowl	28 days.
Guinea fowl	25 days.
Goose	30 days.
Partridge	24 days.
Turkey	28 days.

Despite all ideas to the contrary, the process of hatching can be suspended and held in check for several days without total destruction of the germ. This fact is of practical importance, and if borne in mind may save the breeder a good hatch when, on account of accident or oversight, a sitting of eggs has been left without outside heat and allowed to cool. Such eggs, if subjected to a proper temperature, may hatch out fairly well, provided this temperature is maintained a few days longer than the usual period of incubation. Hence when an accident occurs, it is wise to keep the eggs warm a day or two over their time with the expectation that while incubation may be delayed the germ is still alive and will develop.

INCUBATION. NATURAL. Although modern poultry classification recognises sitting and non-sitting breeds of fowls, the latter nomenclature has only become possible through the artificial modifications resulting from the conditions of domestication; and it is the original nature of fowls to incubate their eggs in pursuance of the maternal instinct, which in their case is of temporary duration and periodic recurrence. One of the most notable characteristics of this instinct in the hen is the search for a nesting place and the construction of the nest—a construction of forethought; and not less remarkable is her conduct subsequent to the filling of the rude structure with a " clutch " of eggs; the compelling instinct of incubation, and its persistence during the period necessary for the development of the embryos within the shells. It follows, however, that having, under domestication, so influenced the characters of fowls, and in some measure fixed variations, by methods of selection, the modern poultry-breeder is not only in possession of breeds which are " non-sitters," but is also faced by the fact that the " broody" quality is very unequal, even among the " sitters." Bearing this fact in mind, the poultry-man learns that it is imperative to test the reliability of a hen before entrusting her with valuable eggs, because just as, for example, a Leghorn is sometimes a close sitter, so on the other hand an Orpington, say, may be quite disinclined to commence sitting or incapable of lasting the period. Just as the incubating instinct may be practically eliminated in one race of fowls, so it is possible to strongly develop it in others; so that the original incubating habit of the Jungle fowl, which was limited, though sufficient, maybe made to recur at frequent intervals. An interesting example of this tendency is found in the old race of fowls used by generations of chicken rearers in Sussex and the neighbouring counties. These rearers have for a hundred years or more—how many more is not definitely known—aimed at an all-the-year-round production of chickens, and their hatching has been by means of hens; the inevitable result is found in the readiness with which the Sussex farmyard fowls will become " broody "—in season and out of season —incubating and rearing in a succession so continuous as to be a matter for surprise to the uninitiated. So marked is the characteristic that it was thought to be not unworthy of some reference in a blue book, issued in connection with the Royal Commission of Agriculture; in his report of 1894, Mr. R. H. Rew, remarks:—

"It was suggested to me that the existence of a native kind of fowls . . . . having an accommodating *propensity to sit early and often*, led the inhabitants . . . . to devote special attention to the rearing, etc.; I am bound to say that, apart from actual evidence, it seems *quite as probable that the industry developed the fowls*."

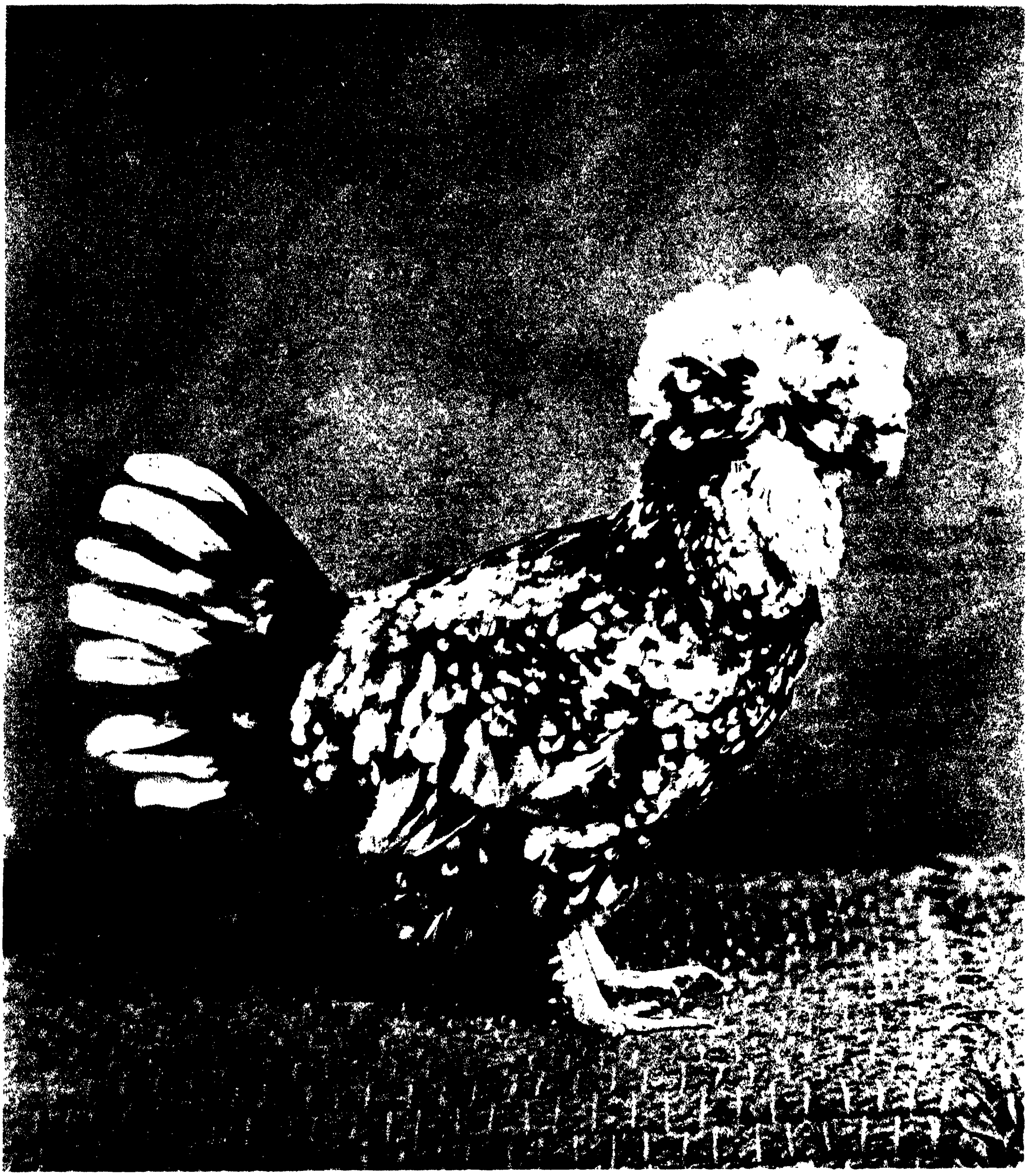


Range of Sitting Boxes.

With these remarks relative to the instinct of incubation, and its modifications under domestication, the process may be considered in detail relative to practical operation.

Although the domestic hen is, when left to her own device, very erratic in her choice of a nesting place, she almost invariably shows a preference for some situation in which she may scratch out a shallow hollow in the earth; and here she either deposits her eggs upon the bare soil, or if her instinct is sufficiently strong she makes some preliminary attempt to line the nest with near-at-hand suitable material. In any case, by the time incubation is in actual progress, there is more or less of down from her own body serving that purpose to some extent. Following the direction thus indicated by nature the practical poultry-man finds there is no better nest—whether it be prepared in a box or elsewhere—than the one constructed upon an earth bottom, either a shovel full of fine mould or a piece of turf. The latter is commonly employed by gamekeepers in setting pheasants' eggs, the turf being cut sufficiently deep and shaped in a nest box in the form of a slight depression. This shaping of the nest is an important consideration and the depression must be neither too deep nor too flat, because in the one case the eggs may easily become heaped and broken, and in the other the tendency will be for some to get pushed from beneath the sitting hen. There must, moreover, be no corners in a hand-made nest; otherwise some of the eggs may get into them and become chilled, and a like fate awaits the chickens after hatching. Hay is the best lining, and although it should not be too thickly used, it must be worked round in the form of the hollow and made firm and shapely. Before the nest is used it should be sprinkled (as well as the sitting hen) with insect powder, and the nest box must be thoroughly cleaned and

PLATE NO. 49



(*J. Russell & Sons.*)

Houdan Hen.

(*Bred and exhibited by Mr. S. W. Thomas, Glasfryn, Forest Fach, Swansea.*)

Winner of 1st and Cup Birmingham, three times 1st and Cup and Trophy Crystal Palace (International), 1st and Championship Lord Tredegar's Show, 1st and Special Liverpool, 1st Norwich, 1st Leeds, and over 30 firsts and many Cups at other shows.

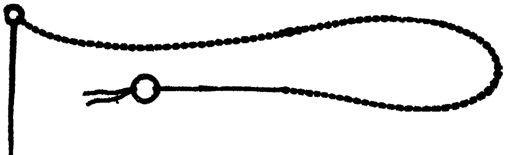
lime-washed between each occupancy. If this is not done, particularly in warm weather, there is considerable risk of a disappointing result, owing to the restlessness of the hen through the constant irritation produced by lice, mites or fleas. Not only will these minute parasites sometimes force a hen to abandon her eggs entirely, but if the infestation is not sufficiently bad for that, they will seriously prejudice the chances of chickens that may be subjected to their attacks when newly hatched. Protection of another description is also necessary when setting a hen—there must be no chance of her disturbance by rats, stoats or foxes, and the construction of the nest box, and the situation in which it is placed, must be such as will prevent any possibility of such attacks. The number of eggs that may safely be put beneath a hen must be subject to individual conditions, some hens being able to cover more than others, and all being able to successfully manage more in the warm months than in the cold, but fifteen should be about the maximum for any hen. The selection of the eggs is a primary consideration if the utmost advantage is to be taken of a hen's broodiness. Not only must they be symmetrical, and neither too large nor too small, but absolutely normal of the class; and they must be hatchable to the highest degree. Hatchability implies far more than mere fertility, and there are many eggs sufficiently fertile to pass the testing, but which never develop to the end of the incubating period; just as there are others from which chickens manage to emerge, but without stamina enough to carry them through the rearing. The vigour of the embryo, and the vitality of the resultant chickens, depend upon other factors anterior to the incubating period under consideration, but the whole subject is so inextricably one, that it is not possible to get good results from incubation if unsuitable material—in the form of eggs—is placed beneath the sitting hen. In order to adequately realize the importance of this subject in its various branches the reader should refer to such articles as "Eggs," "Mating," etc.

In setting a hen it is wise to make some concessions to her natural susceptibilities, and to remember that although what we know as "artificial incubation" implies a mechanical process, the conditions of fowls under domestication have become so modified as to be somewhat removed from the natural order of events. To take a broody hen from the nest of her choice and place her upon eggs in a hand-made nest, shut up in a box, is, after all, in some measure an artificial arrangement—although we speak of it, according to our habit of thought, as "natural incubation"—and it should, therefore, be done as carefully as possible, with the minimum of disturbance and cause for irritability. All hens are in a greater or lesser degree excitable, and most of them are in some particulars tenacious of purpose; for which reasons it is advisable to introduce them to the selected nests after nightfall, so that by the time of the morning's light they may to some extent have become reconciled to their new quarters, or at any rate less resentful of the undesired change. The best plan is to place a few china eggs in the nest at the commencement, and when the hen has once been out to feed and returned and settled down upon the dummies, the real eggs may safely be introduced—preferably at night.

The correct management of sitting hens necessitates judgment and experience, and their gentle handling throughout the process of incubation tends to the success of the issue. Once daily they must be allowed a sufficient time for feeding, exercise and the use of the dust bath—and the period must largely depend upon the time of the year and the prevailing weather conditions; from a quarter to half-an-hour should be about the limits. The character of the feeding must be suited to the maintenance of animal heat, and in cold weather maize may be freely fed to sitting hens ; supplying them also with fresh clean drinking water, and plenty of sharp flint grit. The dust bath must be dry, and whatever material is used should be well sprinkled with insect powder, the process of dust bathing being most helpful in keeping down the insect pests. In bad weather, when the birds cannot be allowed outside for exercise, some scratching material should be provided in a shed and the corn scattered therein to induce the desired exercise ; and on no account should a hen be allowed to re-enter her nest box until she has performed her evacuations, otherwise she will almost certainly foul her nest and eggs. Should she chance to do so, or soil her feathers by means of a broken egg, everything must be cleaned up, and if necessary the hen's feathers should be cleansed, before her return, by sponging.

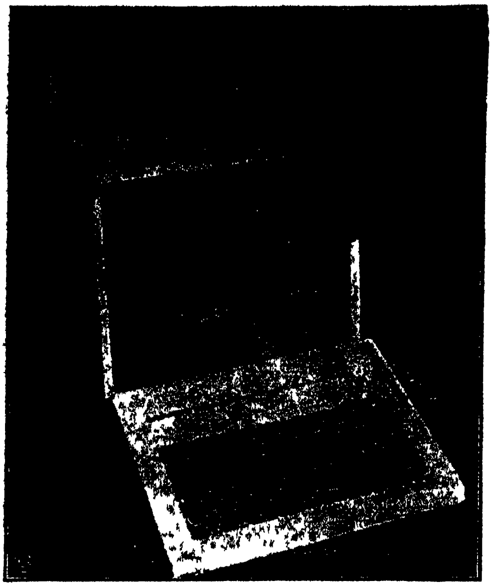
Illustrating a Method of Tethering Broody Hens.

Where a number of hens are set and the weather is open enough to allow outside exercise, the method of the gamekeeper should be adopted as tending to a saving of time, *viz.*, a number of pegs, corresponding to the number of fowls, should be driven in the ground and each hen tethered to a peg in a regular order agreeing to the arrangement of the nests, the tether consisting of a loop and a running noose with a sufficient length between to allow for exercise without the possibility of fighting with next-door neighbours. A further advantage of this arrangement consists in the fact that each hen may be returned to her own nest, without any chance of mistake. The reason for the necessity of so keeping a hen to her own eggs throughout incubation is found in the fact that the temperature of the hen is regulated to the requirements of the eggs at the various stages of incubation, and that a desirable balance is maintained by the slight decrease in the hen's temperature just as that of the eggs increases with the advance of development and the generation of heat by the embryos. The temperature of eggs during incubation varies from about 97½ degrees at the end of the first day, to 98¼ degrees at the end of the second day, increasing to about 100½ degrees at the eleventh day; thence increasing and remaining at about 102 degrees until the time of hatching—the temperature of the hen showing a sympathetic decrease during the incubating period. Although the differences are not great, it will be obvious that the ideal conditions that make for success include this adjustment, and therefore render it advisable to keep the rule—one nest one hen. At about the tenth day of incubation the eggs should be tested, and all but the fertile rejected. For the methods of testing and the various appearances of the eggs, according to their condition, the reader is referred to the treatment of the subject under: "Eggs—Testing." At the commencement of incubation a hen will often show an inclination to remain upon her nest and disregard the opportunity to feed and exercise, but although such conduct appears to have no inimical result where a hen steals a nest and does as she likes, it should not be encouraged when incubation takes place under management—the success of such an undertaking depending a great deal upon system and regularity. In such cases it is desirable to gently lift a hen from the eggs and put her down quietly outside her nest within sight and reach of food and water. It is seldom necessary to do this a second time, the hen usually accommodating herself to the circumstances and falling into line with the others in such details; there must, however, be no delay in feeding at the same time daily. Any irregularity in this respect induces restlessness and a disposition to stand up in the nest—with the risk of cooling or breakage of the eggs. When, however, a hen, whose previous behaviour has been normal, shows a disinclination to leave her nest within a day of the due date for hatching, she should be left undisturbed, such action on her part being due to a natural instinct regarding the present requirements of the nearly due chickens within the shells. The completion of the development of the embryo varies to some extent according to the different influences, but normally the perfected chick should be ready to break the enclosing shell sometime during the twentieth day of incubation; and as this chipping is, in some cases, commenced as early as the nineteenth, the condition of the eggs should be ascertained at that date before a hen is removed from her nest. If, or as soon as, the chipping has been begun in any of the eggs, a little food and water may be given the hen without necessitating her removal, any chilling of the eggs at this time being harmful, and often fatal. The golden rule at hatching time is to leave well alone, and if all is well the chickens will emerge from their shells somewhere between the twentieth and twenty-first day—or in from six to ten hours of the time of first breathing the outer air, after chipping the shell. When it is once ascertained that satisfactory progress is being made, the hen should be left alone to quietly complete the hatch, and all that is permissible on the part of the attendant is the periodic removal of empty eggshells which may be within reach when the hand is quietly placed beneath the hen to discover the rate of hatching progress. Assisted hatches are seldom productive of vigorous chickens, because more often than not it is a want of stamina that causes the inability to emerge unaided; but when there is much delay, and a wish to assist, all that may safely be done consists in the further

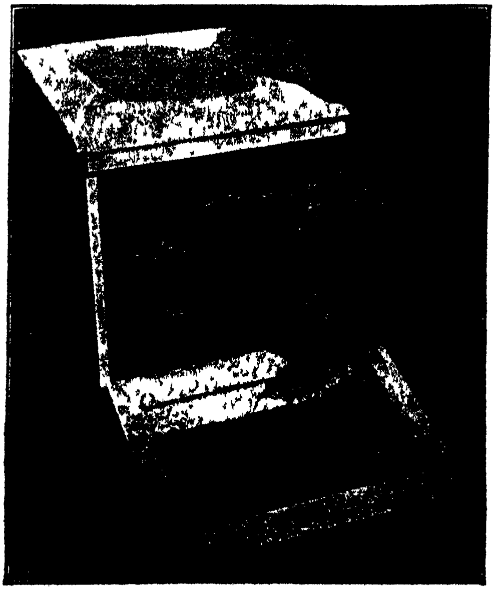


Tethering Chain. (For hen with chickens).
The skewer is pushed into the ground and the tape (on rubber ring) is wound several times round the hen's leg to secure her The rod prevents the chain winding round the hen's leg A length of twine with a piece of wire for a rod answers as well, and costs but a few pence A swivel on the chain or string is necessary.

breaking of an already chipped shell, and the gentle tearing of the shell-membrane, if it is unusually dry or tough. As a general principle it must, however, be stated that any assistance at hatching time is ill-advised, and the sacrifice of the feeble is better than their attempted rearing, not one chicken in a hundred that has been unable to hatch of itself being reared to an adequate maturity. Remembering that there is no period at which so much harm can be done by cooling as when hatching is in progress, and during the subsequent time of drying, nothing further should be done until about twelve or more hours after the last chick has emerged—beyond the offering of a handful of corn to the hen (if she has sat very closely towards the end) as she sits. In this connection it may be stated that the chickens do not require any food for some hours after drying, and if they are first fed at about the eighteenth hour after hatching the period will be very suitable for their requirements. Before being offered their first meal they must, with the hen, be transferred to a coop previously prepared and suitably placed. The hen must be allowed to examine the coop and settle down in a brooding attitude before the chicks are all given her, the chicks being carried from the nest box to the coop in a warm covered basket, and introduced singly and gently beneath her wings. The coop should then be closed and all left to themselves for some time, so that (for example) if the removal is made some fifteen hours after hatching, the chicks will be at home in their new surroundings by the time of their first meal—at about the eighteenth hour. If, as is sometimes done, in the case of a small brood, other chickens are given the hen from an incubator hatching at the same time, the strange chickens may be most safely given at night—being placed under the hen when she and her original brood have settled down for the night. Relative to feeding, rearing and subsequent management, the various subjects are fully dealt with under their several headings. (*See Plates Nos.* 50, 51 *and* 52).

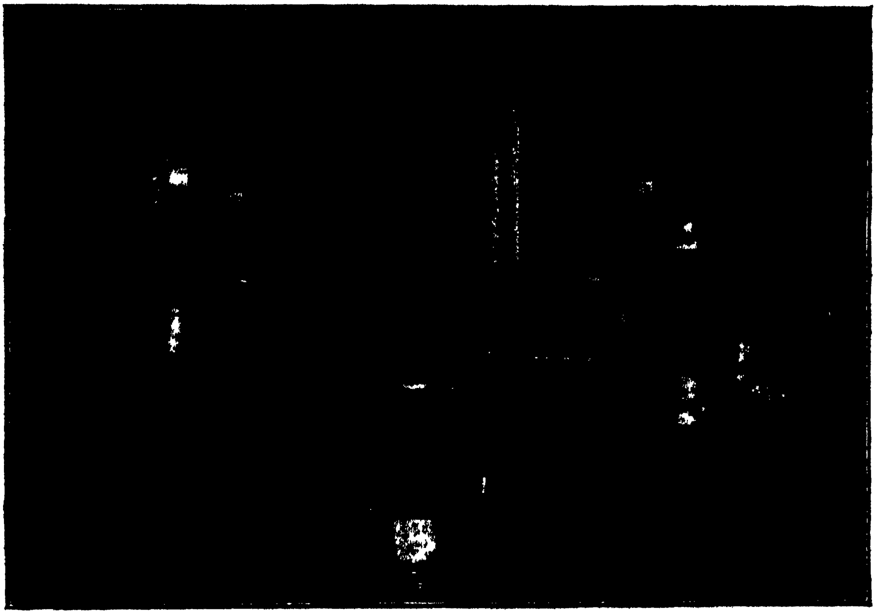


Showing Correct Method of Taking Hen off Nest.



Showing Correct Method of Placing Hen on Nest.

—— **ARTIFICIAL.** It is quite impossible to trace the history of artificial incubation to its original source, and no detailed or connected account of its subsequent development — until comparatively modern times—is available. Such facts as are discoverable are scattered and disjointed in character, but such as they are they serve to prove the remoteness of man's first attempts to imitate the natural process, and as far as possible regulate poultry production by such means. The most prominent example of the artificial application of incubating conditions is that practised in Egypt, in which country the early (perhaps the earliest) methods are retained to this day; and where the artificial hatching of eggs has been so long practised that the hens of that country have practically forgotten their incubating habit. In Egypt artificial incubation has remained a distinct industry, the secrets of which have been transmitted in certain families through successive generations. The present operators, although past masters in the art, confine their operations to the three months of February, March and April, during which period they give their constant and complete attention to that one work, but directly the hot weather sets in the ovens are closed for the year. The larger hatcheries will turn out from 300,000 to 600,000 chickens in a season, and such establishments are usually situated near a populous market centre; it is estimated that at the present day there are an approximation to 150 of these incubating centres throughout Egypt, which is not surprising in view of the fact that poultry enters largely into the native dietary, and that the native fowl is a non-sitter. Those who undertake the incubation distribute the chickens among the surrounding villagers by means of dealers, and the birds are reared by the village women.



Interior of an Incubator Cellar.

In the Egyptian hatcheries a series of ovens are included in one building, and each oven consists of two chambers, one above the other, with fire spaces and ventilating openings at the top. Fires may be lighted (the fuel being straw and dried dung) in each compartment as well as on the floor of the passage, the heat being regulated by the latter to a great extent, no thermometer being used. When a high temperature has been maintained sufficiently long to prepare the building, it is reduced to about 100 degrees and the eggs are laid on matting and bran on the floors of the ovens, their position being changed twice daily. At about the sixth day they are tested, the infertiles being removed, and the remainder again tested at the tenth day; during the last week they are examined every day by the test of touch. After hatching the chickens are left to dry, and then immediately disposed of. The general temperature of the building is maintained at about 98 degrees, that within the ovens being a little over; and the entrances to the ovens are tightly closed except during the turning of the eggs morning and afternoon, and once during the night, when the temperature is ascertained. Relative to labour, it is sufficiently indicative to state that in one particular instance an old man and a lad turn out between 200,000 and 250,000 chicks in the season of three months. The methods of to-day are exactly those of a thousand and more years ago, the type of fowl is similar, and the success and general immunity from disease is the same as it has apparently been through the centuries.

The Chinese appear to have been quite as successful, especially in their artificial hatching of ducks' eggs, which they incubate first in barrels and finally on shelves—partly by means of rice "paddy" and partly by burning charcoal. The eggs are placed with the paddy in the barrels, and eventually on the shelves to hatch, the heating stoves being on the floor. The temperature is maintained at about 94 degrees, the eggs are turned twice daily and the ventilation is casual. There would be no useful object in following the various attempts made by experimentalists in the 15th, 16th and following centuries—attempts based on more or less indefinite theories; and it was not until the last century that any practical results were obtained by the pioneers of the types of machines in operation to-day — when capable commercial incubators are used extensively in every civilised country.

For all practical purposes the machines as now developed are constructed upon one or other of two types, according as the heat is produced by means of a hot water tank or heated air—for descriptions of which see "Incubators, Types"—and as regards actual results there is no very material difference. It would be difficult to estimate the extent to which modern incubators have assisted in the very marked and rapid development of the poultry industry, more especially in this country and in America; but there can be no doubt that the machine has been an important factor and one which the poultry producer can no longer afford to ignore. In many cases an incubator is absolutely necessary for early hatching, and early chickens are essential if the highest averages are to be obtained for the annual production; moreover, in any extensive production it is impossible to maintain an adequate output without such assistance as the use of the incubator as supplementary to the hen. Incubators are great time and labour savers, and it costs less to operate a large machine than to feed an equal number of hens; and if the machines are kept properly cleaned the chickens start without the trouble caused by insects, which are always more or less present in the case of hens.

In regard to the operation of incubators, it must be remembered that all machines are not operated in exactly the same way, which makes it important for the beginner, not only to acquaint himself with the principles generally in operation in the application of artificial methods, but to study carefully the more particular instructions issued with each make of machine. It may be that experience will suggest some modifications of the manufacturer's directions, but experiments should not be attempted in the first instance, and theory must always give place to the lessons of practical experience.

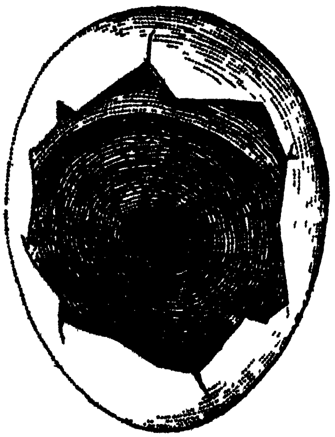
Before proceeding to the consideration of the conditions essential to success in the operation of incubators, and some detailed examination of the questions of heat, moisture and ventilation, it will be advisable to refer to the situations best suited to the working of these machines. The question of location is one upon which there is some conflict of opinion, and outbuildings, rooms, cellars and special erections are variously recommended; but it is well to remember that whatever the situation or description of the accommodation the necessary conditions should include the stability of the structure and its general immunity from vibration, as well as a sufficient system of ventilation to ensure the constant renewal and purity of the air, and the absence of more than normal moisture. It will be seen, therefore, that the conditions are not so easily found in due combination as some would have us believe, especially when we add the further requirement of an approximation to uniformity of temperature. Very few outbuildings are sufficiently solid to prevent vibration, or well-built enough to keep out draughts, while, in common with rooms in dwelling houses, the temperature is usually liable to extremes in either direction; and on the other hand most cellars are more or less damp. As regards uniformity of temperature, however, no situation equals the cellar or underground chamber, and provided it is capable of adequate ventilation, and can be sufficiently drained, it is a most desirable location.

Upon large poultry producing farms, more particularly in America, and to some extent in this country, it is usual to locate the incubators in specially constructed houses or cellars. Such houses are constructed with a view to a good system of ventilation, and are double-walled throughout—the intervening space being lined with paper and filled in with sawdust—to insulate the interior as far as possible from the external fluctuations of temperature. Incubator cellars are as a rule half-cellars or buildings sunk in the ground or earthed up with surrounding banks, a usual excavation of three feet being further aided by the banking up of the surrounding earth some two feet—making the cellar about five feet below the surface.

Removing Newly-Hatched Chicks from Drawer of Hot-Air Incubator.

A cellar must necessarily be built of bricks, carrying a solid roof, and having a good sound floor, and provided the ventilation is well arranged, the temperature should be maintainable within reasonable limits with but little difficulty. An outbuilding, although of special construction, generally gets too warm for good summer results if built entirely above ground; but a half-cellar has a good proportion of its walling kept cool by the surrounding earth, and the air striking against this helps to keep the temperature at a workable degree except in extreme conditions of climatic change.

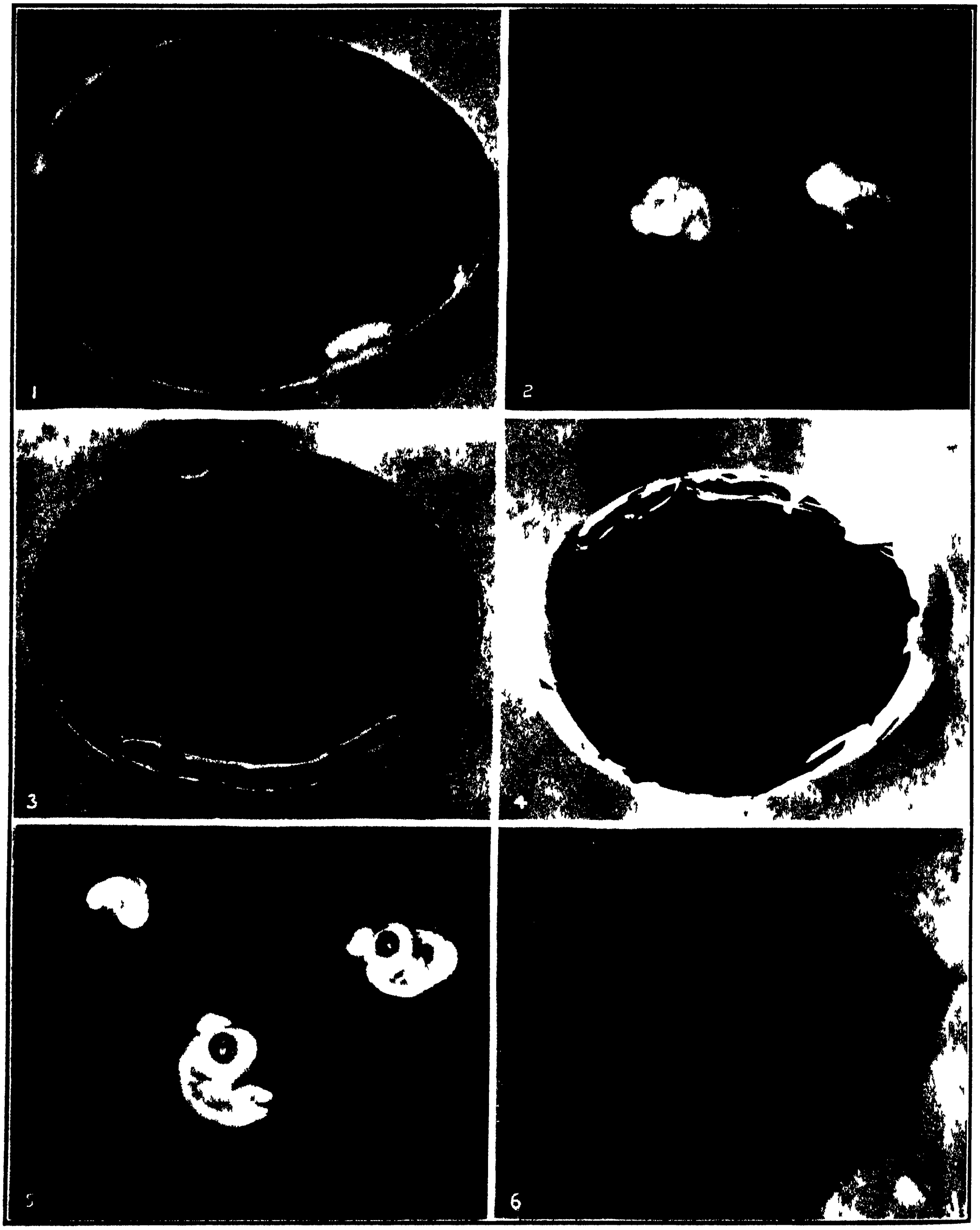
——**HEAT.** Heat is an essential factor in incubation, being the immediate stimulus supplied to awaken the dormant energy of the germ, to produce vital action and embryonic development. Heat is the unknown cause of the sensation of warmth, and of a number of common phenomena in nature; and the most commonly accepted theory of heat is that it is a form of motion, an immaterial force produced by vibrations — increasing with the rapidity of the motion. Yet although it is not more clearly definable, we possess some knowledge of its laws and its power of producing changes in matter—which are generally sufficient for our purpose. Nevertheless, although some poultrymen are content with the knowledge that a given degree of heat is desirable in the successful operation of an incubator, some more detailed information will tend to make the operation clearer and the requirements more understandable.



Showing Expansion of the Blastoderm or Germ-Spot.

Vital action requires heat for its sufficient performance, and a fairly steady temperature is required for the ordinary exercise of animal powers, and this is obtainable by supplying the body with the means of generating heat. Vital or animal heat is produced by chemical changes which take place as a part of the process of respiration, but in the early stage of embryonic development most of the vital energy is required in the growth of the structural parts, and consequently the expenditure available as heat is very small. In ordinary incubation, the eggs put under a hen (or heat-generating body) are warmed primarily by conduction, as well as by diffusion; the shell of the egg being a very good conductor, by means of which a uniformity of temperature is secured. Moreover, the vascular system is rapidly developed (*see* "Development of the Embryo") and the circulation of the blood very quickly assists in the distribution. In the artificial application of heat its equal distribution throughout the whole area of the egg chamber must, as far as possible, be secured, and this is a matter of some difficulty even in many modern machines, so that from a variety of causes—the due explanation of which would involve the use of some considerable space—it occurs in practice that an incubating chamber does not perfectly maintain an equable temperature under all conditions and in all parts—the chief variations taking place in the corners. To equalize matters as far as possible in this important particular it is the custom to alter the daily relative position of the eggs. In many machines the egg trays are made to rest within the machine

PLATE No. 50



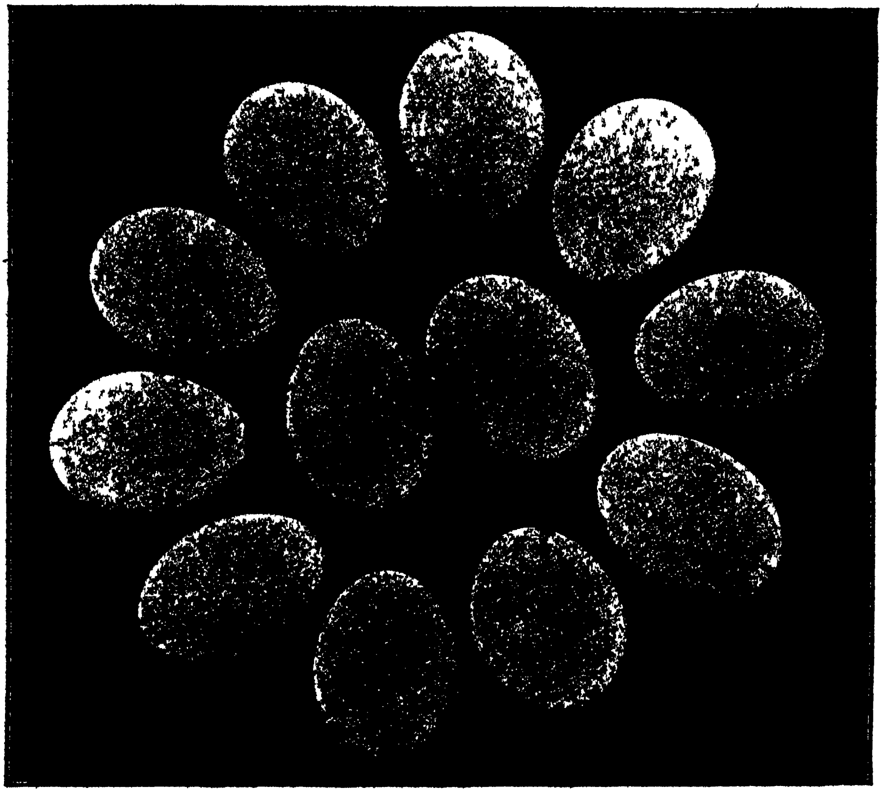
C. I. J. Walkley.] *[Copyright*

Incubation:—Development of the Embryo.

Fig. 1, 2nd day. Fig. 2, 4th and 5th days embryo taken from egg. Fig. 3, 4th day. Fig. 4, 5th day. Fig. 5, 5th, 6th and 7th days embryo taken from egg. Fig. 6, 7th day.

with an inclination towards the centre—where the temperature is usually slightly higher—and whether this construction is adopted or not it is advisable to change the eggs daily in such a manner that all occupy the various possible positions in a regular order of change.

The conditions being further affected by the presence of infertile eggs within the chamber, in consequence of their absorption of heat generated within the fertile ones, the importance of egg testing becomes obvious. The infertiles having been removed, an additional difference may take place in the temperature of the remainder unless they are spread over the available space in the tray or drawer. A full tray will have a higher degree of temperature than one only partly full, and a collection of eggs in one portion of the space will also have a higher temperature than a few in an isolated position. As already stated there is but little vital energy available as heat during early stages of development, but the temperature of fertile eggs increases when (at about the twelfth day) the structure of the embryo is complete, and energy is increasingly released as heat; from which it will be realized that a full chamber of heat-generating eggs will take some considerable part in heating the air around them, but that if the egg drawer contains a more or less scattered collection the loss of heat is individually greater, so that the necessity for an even distribution to ensure the maintenance of an equable temperature becomes apparent.



Sitting of Eggs from which a good Hatch may reasonably be expected.

The manner in which the air is warmed, and the various contrivances for regulating the heat in an incubator, will be found fully dealt with in the article descriptive of incubators; and it remains to be stated here that "the higher the degree of the heating body, the greater will be the difference between that of the egg and the thermometer during the early stages, and *vice versa*"—the thermometer showing a greater degree than is found in the egg. Towards the end there is a nearer approach to equality between the two temperatures.

Before filling an incubator with eggs it should be heated thoroughly and sufficiently tested as to its capability to retain an even temperature under the circumstances in which it is worked, and only when it is found that the temperature within the egg chamber can be kept within narrow limits, the internal and external conditions balancing, should the eggs be placed in the drawer.

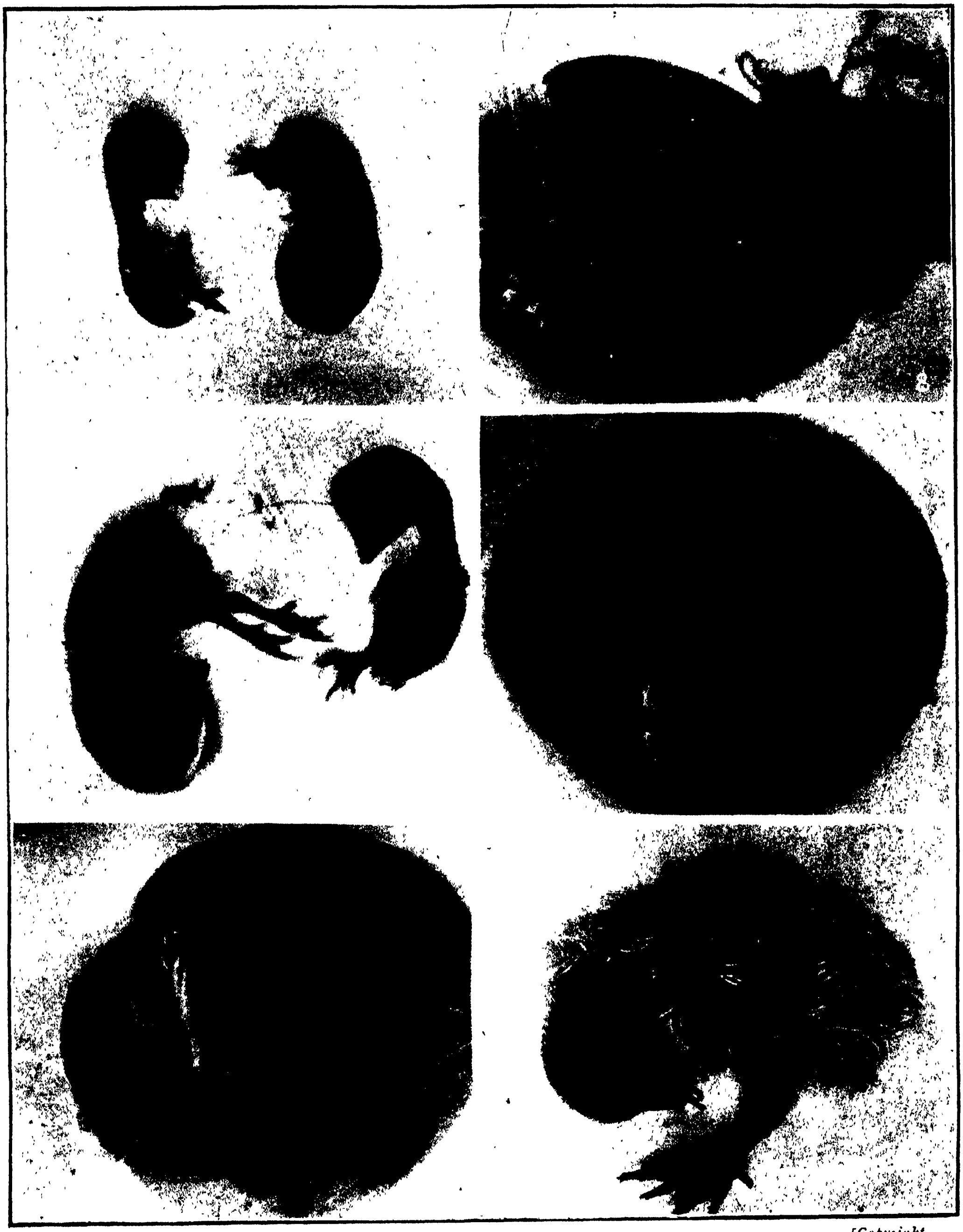
If a thermometer is placed so that its bulb rests upon a fertile egg it will be found that the best average results are obtainable by maintaining the temperature (at that position) uniformly at 102 degrees, allowing about from half a degree to a degree rise in very cold weather ; but unless the external temperature of the incubating room is maintained at a relatively high and uniform degree some latitude with regard to the egg drawer temperature is not only allowable, but necessary—and in some cases 103 or 104 degrees may be essential. In this matter some attention must be paid to the instructions issued with machines of various makes and, making due allowance for such a variable climate as that of England, some such scale as the following is usually recommended :—

Temperature of room	50°	60°	70°	80°
„ within Incubator	105°	104°	103°	102°

If the room temperature is liable to fall lower than about 50 degrees it is unsuitable for the proper working of a machine.

——**MOISTURE.** Although it is perhaps natural in thinking of the essentials for incubation to place heat first, it is nevertheless true that moisture is of equal importance, and, as the result depends upon the proportioning of the moisture with the ventilation, we introduce a third factor, the two last named being so closely connected, and the necessity for their due balancing being so great, that moisture and ventilation become, as it were, one subject. The chief point to understand in connection with moisture is that there is enough of it in a normal egg, for the ordinary purposes of incubation, provided defective ventilation does not result in undue evaporation ; and in machines of the tank description the provision of a water tray is necessary to maintain the balance, rendered essential by the method of operation. The ventilation of an egg drawer by direct openings necessitates the supplying of moisture in proportion to the rate of the movement of the air within the drawer. The rapidity of the evaporation is proportionate to the rate of the air movement, and the latter is greater the drier it is ; and the rate of movement and the exchange with the external air is naturally influenced by the size and number of the ventilating openings. In a machine ventilated by direct openings it is, therefore, necessary to supply moisture, by means of a water tray, throughout the whole process of incubation in order to maintain evaporation at a normal level. As to what relative degree of humidity is necessary in the air within the egg chamber to maintain the evaporation from the eggs at a normal level, this has not yet been ascertained, and is one of the problems of artificial incubation remaining for thorough experimental investigation. Some experimental work in this direction has already been done, and more is being undertaken—both in Britain and the United States of America—and so far as they have gone the conclusions tend to prove that there is some defect in the incubator conditions in this respect, in comparison with the conditions of natural incubation. Experiments conducted at the College Poultry Farm, Theale, extending over some two years, show that the loss of weight in eggs during incubation is greater when the heating body is mechanical than when the hen performs her natural function, the loss being due

PLATE No. 51



C. E. J. Walkley.]

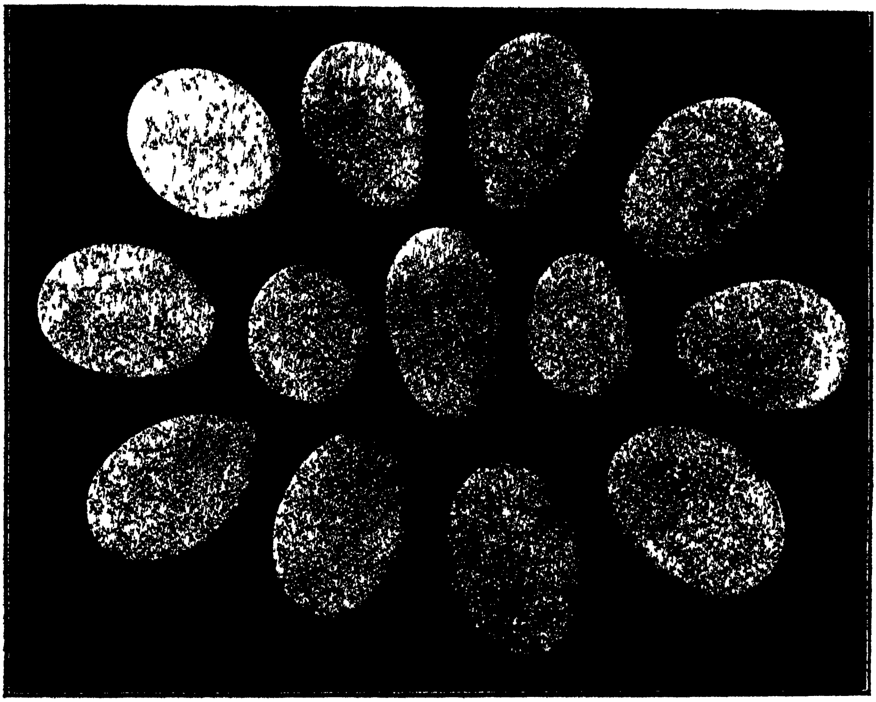
[Copyright.

Incubation:—Development of the Embryo.

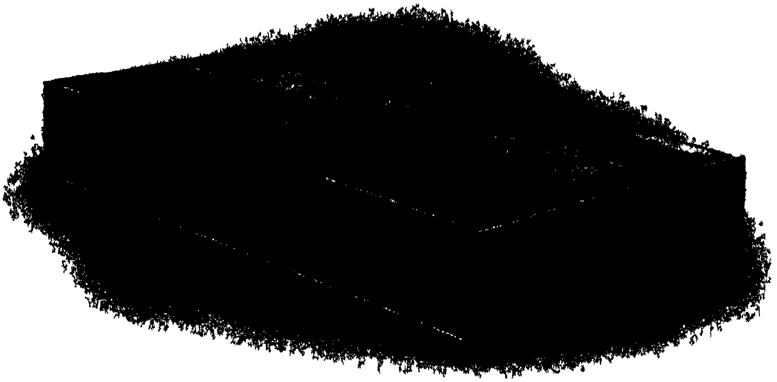
Fig. 7, 8th and 9th days, embryo taken from egg; Fig. 8, 9th day. Fig. 9, 10th and 11th days, embryo taken from egg; Fig. 10, 11th day; Fig 11, 13th day; Fig. 12, 13th day, embryo taken from egg.

to the evaporation of the more liquid portion of the egg, which proceeds more slowly under a hen than in any ordinary type of incubator. Experiments along very similar lines were carried out at the experimental station of the Oregon Agricultural College, during a portion of the year 1908, including a series of moisture tests designed to show what degree of humidity in incubation gives best results in hatching; and the report issued in the same year, states: "The proper degree of humidity in incubators has not yet been determined, but it would seem that these experiments have brought us close to an actual demonstration. The tests show unmistakably that moisture or humidity conditions of the egg chamber of the incubator have a remarkable influence on number of chicks hatched. . . . . It is a question of some importance as to what effect climatic conditions have upon hatching. Will the eggs hatch better in a dry climate than in a moist one? Does the incubator require moisture in a dry climate and none in a humid one?" There is room for a great deal of study and experiment in this connection. Meanwhile the incubator operator should follow the directions of the makers, remembering that in the American atmospheric machines there is no apparent need for supplied moisture, owing to the fact that the incoming air is warmed and distributed so uniformly and so slowly that draughts are prevented in the egg chamber; and it is a matter of experience that these non-moisture machines do not appear to be affected, as regards hatching results, by the climatic conditions as to humidity.

——**VENTILATION.** If it is once realized that from the moment of impregnation embryonic life exists within the egg, and that when that egg is subjected to a sufficient degree of heat the embryonic life—which had been, as it were, dormant in the interval—commences to develop, it will at once be apparent that an adequate system of ventilation is essential to the existence of the life so actively progressing within the egg drawer of an incubator. A system of blood circulation


Eggs of a shape to be Avoided when Selecting for Sitting.

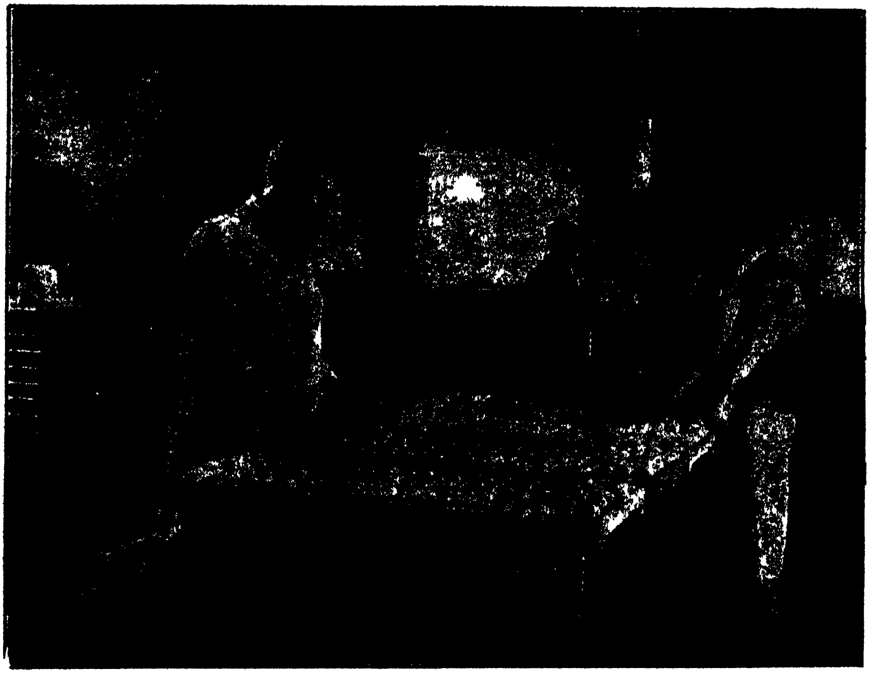
is at work within the shell of an incubating egg, and this stimulus is maintained by means of a certain exposure to the atmosphere, the oxygen of which must have free access through the porous shell and the membranes to the embryo. If the pores of the shell be stopped, development will only continue until the oxygen within becomes exhausted, when, unless a fresh supply can gain admission, the life of the embryo will cease, the immediate reason being that the nutriment of the yolk substance is not rendered available for the sustenance of the embryo unless it undergoes certain changes, which depend upon the aeration of the blood. The expulsion of certain gases and vapours and the entrance of oxygen are essential to the process of respiration, and during the whole of the development, or practically so, some form of respiration is in progress within the egg. It will, therefore, be seen that ventilation is not only necessary, as in the case of adult animals, to supply the fresh pure air, but also to convey away the impurities given out by the developing embryo; and, as has been already shown, the movement of the air must be as gradual and steady as possible, because a draught or current of air unduly hastens evaporation. The rate at which evaporation proceeds depends, therefore, upon the humidity and movement of the air that surrounds the egg in the hatching chamber. If the process is unduly hastened the embryo may entirely die, or the size of the resultant chick may be so diminished that it becomes too weak to emerge, and the result is what is commonly known as "dead in shell." It appears from recent experiments that the size of the chickens at hatching is in some measure indicative of the correctness or otherwise of the operation of the machine—more particularly as regards the proportioning of humidity and ventilation. In this latter connection it has, moreover, been proved that an excess of moisture is equally injurious in the opposite direction, practically resulting in the drowning of the embryos. Relative to the ventilation of the egg chambers within tank machines, where there is no ventilation except through the direct openings, Mr. Cyphers (the author of "Incubation and its Natural Laws") lays down the following rules: "The required number of half-inch holes in the *bottom* of the machine, for each hundred eggs, to maintain the atmosphere respirably pure, are as follows: For the first ten days of incubation, under an outer atmospheric temperature of from 50 to 70 degrees, three holes; under an atmospheric temperature of from 30 to 50 degrees, two holes. From the tenth day to exclusion, under an atmospheric temperature of from 55 to 70 degrees, six holes; under an atmo-


Pedigree Tray for Fitting in Hot-Air Incubator. (*Incubator Components Co*)

spheric temperature of from 40 to 55 degrees, five holes; and under an atmospheric temperature below 40 degrees, four holes." According to this method of ventilation by bottom holes it is best to distribute the openings evenly over the bottom, and in machines so constructed the air as it enters is filtered through a piece of coarse canvas, which is kept damp by the water in the water tray.

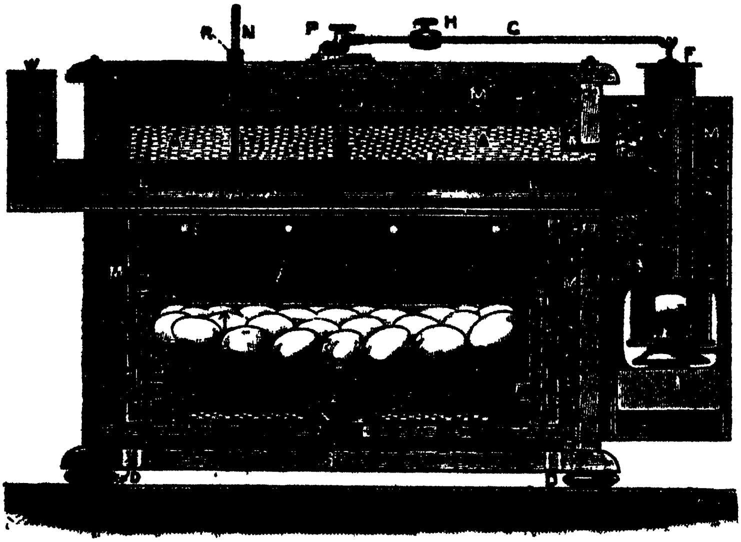
The question of ventilation is, of course, in some measure ultimately referable to the room in which the incubator is operated and the manner in which that is ventilated, bearing in mind that the air received into the incubator is drawn from that in the room, the oxygen of which is being, to some extent, consumed by the lamp of the machine throughout the process It follows, therefore, that if pure air is to reach the embryos undergoing development, by an adequate system of ventilation within the machine, perfecting the method of ventilating the room itself is a matter for prior consideration.

The cooling or airing of the eggs daily throughout the process of incubation is so intimately connected with the subject of ventilation that it demands some consideration in this place. We know enough of the laws governing the movements of gases to understand that in a properly ventilated machine the eggs will not be deprived of sufficient oxygen for development, even if there is no methodical cooling; but we also know by experience that the best results are obtained when this operation is sufficiently performed. It is, therefore, probable that the most important result of cooling consists in the strengthening and increasing of vital force, rather than its maintenance. The cooling process is in effect the beginning of a hardening process, which is better continued subsequent to hatching if it has been commenced coincidentally with the beginning of development. There is far less risk of failure through over than from under cooling, the latter being a very probable cause of deformity in chickens. During the process the egg



Turning the Eggs at a large Incubation Station.

trays should be entirely removed from the incubator and the period may be gradually increased up to as long as about thirty minutes during the last week—subject, of course, to modifications imposed by temperature. In artificial incubation no exact rules regulating this matter can be given, without the reservation that they must be modified according to the judgment of experience; but it generally follows that the best results are obtained where the greatest amount of cooling is allowed that is consistent with punctuality in hatching. It must be noted, however, that the same end is not equally attainable by the abnormal introduction of fresh air into the egg chamber, because with the increased movement thus occasioned other elements would require further consideration in order to prevent irregularity in the process—as will be evident from what has been previously stated. As some general basis for the regulation of periods of cooling the following will serve as a guide: In using a hot air incubator of any approved construction, operating at a temperature of from 102½ degrees to 103 degrees, cool the eggs 10 to 15 minutes in a room temperature of 40 degrees; 15 to 20 minutes at 50 degrees; and 20 to 25 minutes at 60 degrees. The shorter periods during the first week of incubation and up to the longer subsequently as the incubating period progresses. In very hot weather, with the incubator running at 102 degrees, and a room temperature exceeding 70 degrees, the cooling may safely be extended to as much as forty minutes after the eighth day of incubation. All of which is subject to modification in the individual cases.



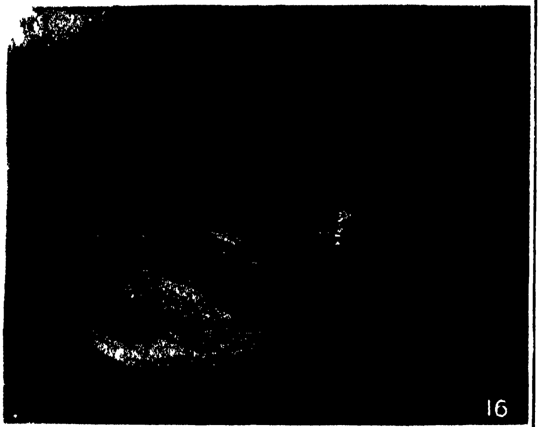
Sectional View of Hearson's Incubator. (*See Text*)

INCUBATORS. TYPES AND CONSTRUCTION. Incubators may be divided into two classes, namely "Hot Water" and "Hot Air." There are several types in each class, differing more or less in mechanical details, but it will only be necessary to deal with the general principles.

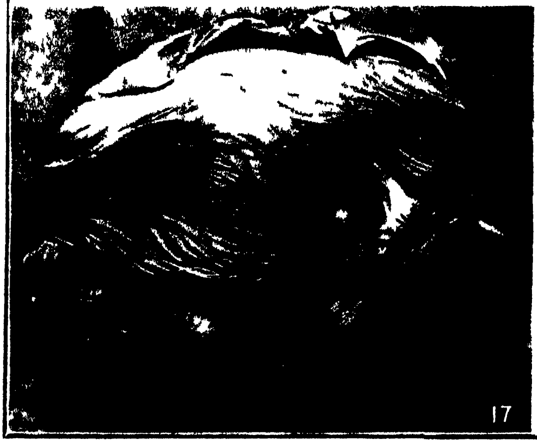
The first practical model of the hot water or tank machine was the invention of Charles Edward Hearson, and patented in the year 1881. This incubator consists of an outer case, above the baseboard or bottom of which is fixed an inner floor (see illustration), so that an air space exists between them. In the base, holes DD, about one inch in diameter, are formed, one hole being placed near each corner. In the centre of the inner floor a hole D, about two inches in diameter, is formed. Fixed to the underside of the base are four blocks or legs so as to raise the incubator and allow the air to pass under it. It is by way of the holes in the base DD, the cavity between the base and the inner floor, and the hole D in the inner

(The Encyclopædia of Poultry.)

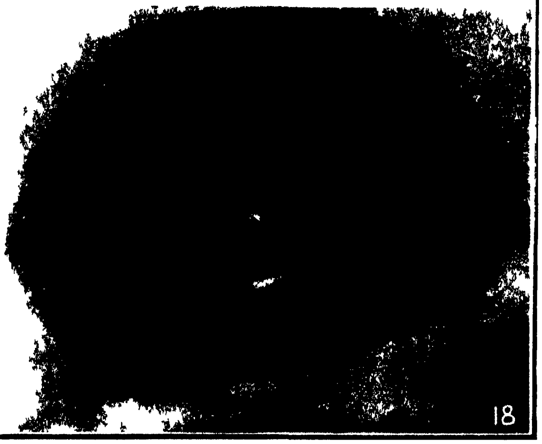
PLATE NO 52



16



17



18

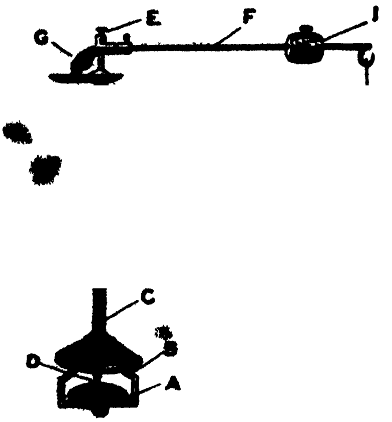
C. F. J. Walkley.] *[Copyright.*

Incubation:—Development of the Embryo.

Fig. 13 14th day Fig 14 16th day Fig 15 17th day Fig 16 18th day Fig 17 20th day Fig 18 21st day floor that the air finds access to the egg chamber. By the ingenious construction of the base and inner floor, no draught of air can play directly upon the eggs. Standing upon the inner floor is a square metal pan CC, known as the moisture tray. In the bottom and centre of this tray, a hole about four inches in diameter is formed, and is surrounded by a strip or hoop of metal corresponding in width with the depth of the tray. This hoop has its upper edges notched, and is surmounted by a disc or air radiator. An inverted tray of perforated metal, about an inch in diameter less than the moisture tray, rests inside the latter, and is covered by a piece of porous fabric, the edges of which, when the incubator is in use, dip into the water contained in the tray, and by capillary attraction becomes saturated. This moisture arrangement acts in conjunction with the ventilating arrangements in the base of the incubator. The air enters the holes DD and travels between the base and inner floor, and on through the hole in the latter D. It then becomes evenly distributed by the air radiator in the centre of the moisture pan, and passes through the porous fabric and becomes loaded with moisture, and then enters the egg chamber. It will be seen that the incubating eggs are supplied with combined air and moisture, the former being necessary for the supply of oxygen to the developing embryo chicks, and the latter, by surrounding them with humidity, prevents an undue evaporation of the watery constituents of the eggs.

The drawer or egg tray KK, when in use, rests above the moisture tray, and is removable from the incubator by means of an aperture formed in the front of its case. The floor of the tray or drawer is of perforated metal, so that the air passing through the base of the Incubator and carrying moisture from the water tray may enter the egg chamber. This perforated floor is covered by a porous fabric on which the incubating eggs rest. In the centre, and at the front of the drawer, and at a suitable distance from its floor, a hole is formed for the insertion of a thermometer, so that the atmospheric heat of the egg chamber may be ascertained without exposing the eggs. Above the egg tray is a copper tank AA, which rests on boards standing edgewise upon the inner floor, and about an inch from the inner walls of the Incubator case. These boards, which extend along the sides and back of the egg chamber, form what is known as the inner case. The space M, between this inner case and the outer case, is packed with non-conducting material, which not only prevents an undue escape of heat from within, but guards the egg chamber against sudden changes of temperature in the atmosphere surrounding the incubator. The inside of the tank is provided with a circular flue GG, through which the heat from the lamp T travels, and heats the water surrounding it. One end of this flue, which projects through the incubator case, joins midway between its top and bottom a sectional flue VL, fixed in a perpendicular position. The opening at the bottom of this flue is for the reception of the lamp burner, while that at its top is covered by the disc or damper F of the heat regulator, a description of which is given on the next page. The sectional flue is encased with metal and packed round with asbestos fibre M. The end of the tank flue is provided with an exhaust pipe W. Provision is made by means of tubes with screw caps for filling or emptying the water tank. The function of the water tank is to generate heat in the egg chamber above which it is fixed. Through the front and back of the incubator case, and just below the bottom of the tank, holes EE are formed, which conduct the air entering the base of the incubator to the outer atmosphere.

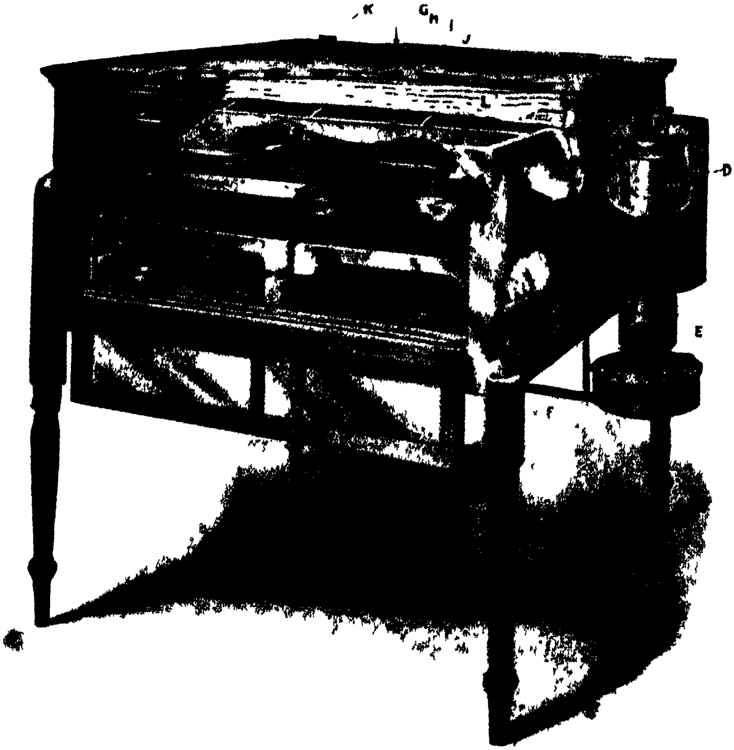
As the hot water incubator is generally provided with an upper chamber in which to dry the newly hatched chicks, we will endeavour to give a description of the same. This chamber, or drying box, as it is termed, covers the hot water tank for some distance from the front wall of the incubator case. The floor of the chamber is raised a little off the top of the tank so as to form an air passage, which is in communication with the outer air by means of holes formed along the front of the incubator case. Running along the back of the chamber and resting on its floor is a board fixed edgewise, in which holes are formed, and a little distance from this board another board is fixed edgewise and rests on the top of the tank. Holes are formed in the front and near the top of the drying chamber. When in operation the air enters by way of the holes in communication with the space between the tank and floor of the chamber, and in its passage becomes warmed. It then enters the chamber by way of the holes formed in the board running along its back, and, after passing over the bodies of the chickens and absorbing the moisture from them, it finally escapes by way of the holes formed in its front. The drying chamber is covered by a glazed panel, while that upper part of the tank not covered by the former is thickly coated with non-conducting material, above which are the boards forming the top of the incubator case.



Tamlin's Capsule Regulator.

We now come to the heat regulator, or that mechanical part of the incubator controlling the temperature in the egg chamber. The capsule or thermostat A consists of two thin plates of metal joined together at their edges to form a receptacle which is charged with a volatile fluid. This fluid boils at a lower temperature than that required to operate the Incubator, and under the action of heat is rendered vaporous, and as this vapour requires additional space, the plates of the capsule become bulged. The capsule rests on a stirrup B, which is screwed to a length of tubing C passing through the incubator tank. Resting upon the centre of the capsule and extending through the tube, is a thin but strong metal rod D, the upper end of which is inserted in the lower end of a broad headed screw pin E, the object of which is to raise or lower the arm F, pivoted or hinged to the fulcrum bracket G, and at the end of which hangs the damper H. The lead weight I, through which the arm passes and along which it slides, is for the purpose of adjusting the temperature in the incubator by putting pressure upon or taking pressure off the capsule as required. The action of the heat regulator is as follows: Should the heat in the incubator exceed that at which it is adjusted by the sliding lead weight I, the capsule A overcomes the pressure placed upon it, and by bulging lifts the arm F by means of the rod D, when the damper H is raised and the heat from the lamp is cut off from the tank, and escapes at the top of the lamp flue. The thermometers used when operating the hot water incubators are of glass with the several degrees engraved on their stems. Some are straight, and must be withdrawn some distance from the egg drawer to be read, while others are what are known as L shape, the longer portion of which has the bulb attached, and which is inserted into the egg chamber, while the shorter portion, on which the degrees are engraved, remains outside for ready reference.

We will now describe a popular hot-air or American non-moisture incubator. The body of this machine, which is mounted upon legs, consists of a wooden case with glass panels at its front, and is hinged so as to fall downwards when opened. Inside the upper part of the case a flue is fixed, one end of which projects through the former and joins what is known as the heater D. This heater is so constructed as to prevent lamp fumes or carbonated air from entering the egg chamber during the process of incubation. The air which feeds the egg chamber passes through the heater, and in its passage is rendered sufficiently warm to raise the temperature inside the machine to the required degree. Inside the incubator case, and below the hot air flue is a diaphragm, or partition, of porous fabric O, the object of which is to diffuse or evenly distribute the heat entering the Incubator. Below this diaphragm are the egg trays P, which have wire-woven bottoms. These trays are removable for the airing of the eggs. A little distance from the floor of the Incubator case a diaphragm, or partition, of porous fabric, R, is placed forming the roof of a lower chamber from which an exhaust pipe C is connected with the escape flue E of the heater.



Sectional View of Cyphers' Non-Moisture Incubator.

The temperature of the egg chamber is controlled by means of a specially designed regulator, a short description of which is given below. When the incubator is in operation, the air enters the lower part of the heater D and, becoming warmed, absorbs moisture from the outer air. It then travels upwards through the heater, and on through the flue, which conducts it [illegible] the upper and interior part of the incubator. Having filled the upper part of the incubator it becomes congested so that it is forced downwards through the porous diaphragm O, which diffuses or evenly distributes it. It then descends through the egg trays and on through the lower diaphragm R, and finally escapes by way of the exhaust pipe C. The method of applying heat as described above ensures automatic ventilation, which not only supplies the eggs with pure moist air, but carries away, by means of the exhaust pipe, such injurious gases as are generated by the developing embryo chicks.

The heat regulator used in the operation of this incubator is, as will be seen by referring to the illustration, quite dissimilar from that used in operation with the hydro machine. The thermostat F is composed of three bars of metal—two ing then, the origin of the bird, one can form some idea of the type and character of the breed. The head of the cock should be thick and heavy, with a powerful beak. The comb, known as a pea-comb, is usually taken off, for in these as in all other Game fowls, dubbing is recognised and allowed. The eye has rather a piercing look and with age a somewhat sullen expression, but the birds are not so sour in disposition as they look. With a short thick neck, broadly set shoulders, the wing butts standing out, both adding width and denoting strength, the thighs set widely apart, thick, hard and firm, they look what they really are, the bulldog of the poultry fancy. It should have a short leg of a rich orange colour and a short thigh, with as much bone about it as possible, and in weight will go up to 12 lbs. The wing must be small and fit closely in behind, while the carriage of the tail must be rather low, and not have any surplus feather. In fact, the shorter of feather all Indians are, the better; but it must be hard, a soft fluffy plumage being entirely out of keeping with the variety. The breast, thighs and tail must be a rich lustrous green-black, but the neck and saddle hackles will show a little striping of a rich chestnut shade. On the shoulders the colour should be a rich crimson brown, while the wing bay must be of the same nature, though rather lighter in colour. A narrow chest or round back are faults not tolerated in the breed. The Indian Game hen is one of the most handsome fowls of the poultry yard. In general characteristics she much resembles the cock, for in type she must be wide in front, legs set widely apart, not too long in back, and finish off with a clean close fitting tail. With the feather short and hard, the shoulders stand out clear and yet the wing ends will be drawn close into the body. Head points and quantity of bone count as much as in her companion, but in marking there is a great difference The body of the hen must be a rich chestnut brown colour, sound and level all through. Each feather is laced with a very rich beetle green edging, while another mark runs round the inside of the feather, thus forming the double lacing so often referred to in exhibition hens. This is not easy to get, for although it should extend right down through the breast, fluff and on the cushion, these parts will often come singly laced. The shoulders usually show the double lacing, but for all the best specimens it must run right through the body. This makes it difficult to breed both sexes of an exhibition type from one pen. As a fowl the Indian Game has a type of its own. Though similar in many ways to the Aseel, it is much bolder in appearance, and larger in body. It is a great favourite with a considerable section of the fancy. The club which looks after its interests is one of the strongest for any one-colour breed. It forms the first part for any cross when breeding solely for table purposes, for it has weight and width which no other breed possess. An attempt was made a few years ago to bring out another colour of the breed, the ground colour being the same, but where the present one is black the new one was white, and although they looked pretty the club would not recognise them, and they soon died out. (*See Plates Nos.* 53 *and* 54.)

INDIAN RUNNER (*see* "Ducks.")

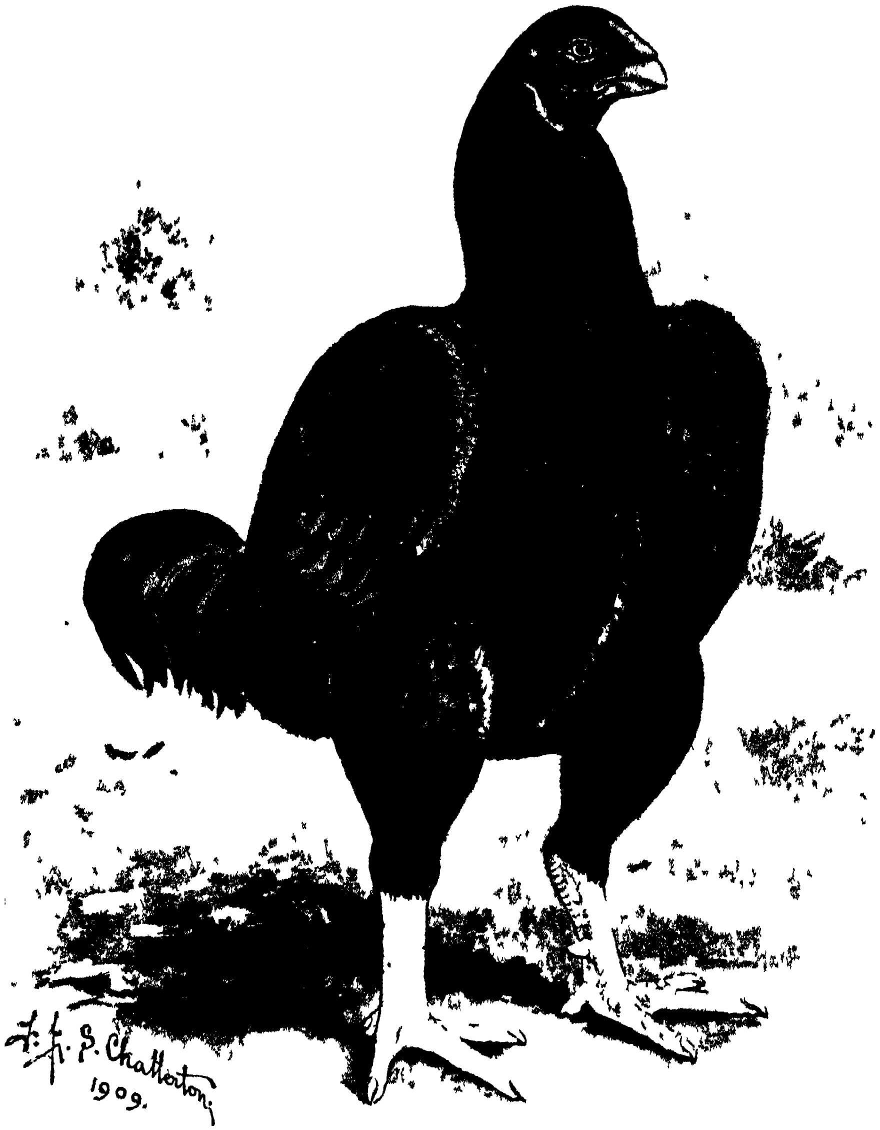
INDIGESTION (*see* "Crop binding.")

INFLUENCE, DURATION OF MALE'S (*see* "Fertility.")

INSECT PESTS (*see* "Parasites.")

INSTRUCTION IN POULTRY-KEEPING. The advance made in organized instruction in poultry-keeping, although still far short of the requirements in many particulars and many districts, is on the whole satisfactory, and the

PLATE No. 53.



Indian Game Cock.

(*The property of Messrs. Firth Bros., Wharton Farm, Acton Vale, London.*)

Winner of International Champion Trophy Crystal Palace Champion Challenge Trophy and Challenge Cup Indian Game Club Show (Chesterfield) 2 Challenge Cups Wimborne Challenge Cups Stockton and Portsmouth Challenge Cup Southend firsts and Specials at all leading shows Royal Royal Counties Birmingham, etc

progress in this direction has perhaps been more specially noteworthy during the period from the commencement of the present century. If for purposes of comparison we go back a generation, to the time when those engaged in such industry as then existed were almost without exception more or less ignorant of requirements and methods of production—and rather contemptuous of poultry as a serious integral part of agriculture, the present position (with all its shortcomings) appears the more remarkable and encouraging. In those days poultry instruction was practically unknown as a branch of agricultural education, whereas now there are relatively few agricultural districts in which there is not some teaching provided by the authorities. During recent years the interest in poultry production as an industry has received some direct and practical encouragement from the Board of Agriculture, and in addition to the several institutions at which courses of instruction are given, as a part of the whole curriculum partially supported by grants of money from the department, the Board has shown its practical interest in laying competitions and has from time to time dealt with various aspects of the subject in leaflet form. These leaflets are prepared from information supplied by experts, and on account of their reliability, concise wording and handy form, have proved of great value to agricultural poultry producers, and as their distribution is free, their circulation has been very considerable. This method of instruction should prove of ever-increasing value, particularly in remote districts and in the case of isolated producers, who would scarcely otherwise be reached by any of the systematised teaching of the authorities. In connection with the various Agricultural Colleges and Institutions which receive the assistance of direct Government grants, poultry instruction is made a more or less important feature at the following: The University College of North Wales, at Bangor, directs lectures delivered at certain centres, relative to which the Superintending Inspector of the Board of Agriculture reports a considerable opportunity for the extension and improvement of the industry in North Wales, throughout which a considerable interest has been aroused.

The Agricultural Department of the University of Leeds, acting in connection with the three Ridings of Yorkshire, includes a lecturer in poultry keeping upon the permanent college staff and provides for the subject in a special course. Special courses of lectures are also arranged at various centres in the three Ridings.

The Agricultural Department of the University College of Wales, Aberystwyth, acting in connection with the counties of Cardigan, Carmarthen, Brecon, Pembroke, Merioneth, Montgomery and Radnor, recognising the backwardness of the industry in Wales, has included poultry-keeping in the work of the experimental farm, and also directs courses of lectures in different centres.

The University College, Reading, acting in connection with the counties of Berks, Bucks., Hants. and Oxford, makes a very serious attempt to deal with the subject on a wide basis, and includes upon the staff a lecturer and an assistant lecturer in poultry-keeping, who conduct short courses, terminal and combined courses, on the subject. In addition to the theoretical training of the class-room there is a considerable amount of practical work undertaken upon the special experimental farm in connection with the college. This farm is devoted entirely to poultry work, and is about forty acres in extent, being well-equipped with all modern appliances, workshops, etc.

The South-Eastern College, Wye (University of London), acting in connection with the counties of Kent and Surrey, numbers a lecturer in poultry-keeping upon its standing staff, the subject being taken by first and second-year students, and about one-third of the instruction consists of practical and field work. Lectures are also given at centres in the two counties named.

The Midland Agricultural and Dairy College, Kingston, acting in connection with the counties of Nottingham, Leicester, Derby and Lincoln, has a lecturer in poultry-management and the subject is taken in a special course which includes practical demonstration, whilst short lectures are arranged at centres.

The College of Agriculture and Horticulture, Holmes Chapel, supported by the County Council for Cheshire, appoints a lecturer for the combined subjects of dairying and poultry keeping, the latter subject being taken by first, second and third-year students—and external lectures are arranged from time to time. The certificate issued in connection with poultry has special reference to practical routine work.

The Agricultural and Horticultural College, Uckfield, supported by the County Council for East Sussex, appoints a lecturer in poultry-keeping, and the subject takes a prominent place in the several courses. The work for the certificate includes hatching, rearing, feeding, cramming, killing, dressing, marketing and egg testing in addition to entomology and carpentry. Practical work is compulsory, and is made a great point at this college. Complete courses of lectures are also delivered at a number of centres throughout the county.

At the County Technical Laboratories, Chelmsford, supported by the County Council for Essex, there is an instructress in dairying and poultry-keeping, poultry management being included in the usual courses of the dairy school, and lectures delivered at a considerable number of centres.

The Eastern Counties Dairy Institute, Ipswich, appoints a poultry teacher and holds a poultry school twice a year, in addition to the inclusion of lectures in the external work.

The Cumberland and Westmorland Farm School, Penrith, has a dairy and poultry instructress, instruction in poultry dressing being a special subject in the full course, and lectures being given in the two counties.

The Hampshire Farm School, Basingstoke, appoints an instructor and assistant for the combined subjects of dairying, poultry and bee keeping; and practical field work is included in the general course.

The Agricultural Institute, Ridgmont, supported by the County Council for Bedfordshire, appoints a lecturer in poultry-keeping, and summer and winter courses of instruction are arranged, as well as lectures at various centres.

In addition to the above, the following separate instruction is provided by County Councils in England and Wales, the work not being under the direction or control of the Board of Agriculture, but undertaken independently by the several Councils through their own staff. Special courses of lectures are given at different centres throughout the various counties by the lecturers appointed by the County Councils of Buckinghamshire, Cheshire, Durham, Devonshire, Hertfordshire, Huntingdonshire, Monmouthshire, Northamptonshire, East Suffolk, Somersetshire and Worcestershire.

A similar work is undertaken in Wiltshire, and large numbers of farms are personally visited by the lecturers, whilst in Kent the visiting system is even more thorough. In Norfolk the same method has been adopted, in addition to the lecturing, and special scholarships, tenable at the Eastern Counties Dairy Institute, are awarded. Similar scholarships are also awarded in connection with the work in West Suffolk.

Upon the experimental farms of the Cornwall County Council, breeding, feeding and laying experiments are undertaken for the instruction of the farmers in the county. In Gloucestershire instruction is given at various centres, and trussing classes are held, while demonstrations are also given at local shows during the summer. Poultry-trussing demonstrations are also given at the agricultural shows in Hampshire, by the county staff. In Herefordshire, in addition to courses of lectures at centres, a four weeks' poultry and dairy work course has been undertaken.

In Lancashire, at the Hutton Farm, maintained by the County Council, there is a poultry school where systematic courses of instruction are given to the students attending the dairy school, and more advanced instruction to those who are able to give their whole time to the subject. The poultry section of this farm is well equipped with appliances, and the work embraces all branches. The Royal Lancashire Agricultural Society arranges competitions, in dressing and trussing, among the students. Lectures are also given throughout the county.

Relative to instruction by means of demonstrations special mention must be made of the practical demonstrations of dressing for market, trussing for cooking, boning, etc., which are always a feature at the annual Smithfield Club Show, held at the Agricultural Hall, London. This display, in conjunction with the concurrent show of dead poultry, serves to make the Smithfield show of considerable value as an object lesson, and worth particular mention under the general heading of "Instruction in Poultry Keeping;" indeed, did space permit, much might be said relative to the educational aspect of exhibitions, particularly those including breeding pens, and so forth.

With regard to poultry instruction in Scotland, special attention must be drawn to the work of the poultry department of the West of Scotland Agricultural College, at Holmes Farm, Kilmarnock, which is under direction of a member of the staff. Courses of lectures are arranged and practical work may be begun at any period independently. At the East of Scotland College of Agriculture, Edinburgh, poultry instruction also receives a fair share of attention, and the whole subject of production is likely to be much more seriously considered in Scotland in the future.

In connection with the progressive work of the Department of Agriculture and Technical Instruction in Ireland, and the various local authorities in that country, a striking recent development is especially noteworthy. County Tyrone, which is always very progressive in matters appertaining to poultry production, has adopted a scheme of itinerant instruction which is much more ambitious than the usual method of arranging courses of lectures at given centres, including, as it does, such practical demonstration as is possible in the form of a portable poultry farm, which is periodically removed from one part of the county to another. The equipment of this travelling object lesson includes sectional fowl houses and runs; duck house, with run and artificial pond; incubators, and hot and cold brooders; fattening pens and cramming machine; and all the appliances connected with trussing, grading, packing and egg testing —as well as a food cooker. In addition to which, the live stock includes: Pens of stock fowls and ducks; running chickens, and fattening fowls. The usual mode of operation is to get a farmer at each stopping place to lend a field and a building for a month or six weeks, to set up the appliances, turn down the stock and invite the surrounding inhabitants to lectures and demonstrations in a barn or other available building.

Other methods by which instruction is imparted and received include the boarding of pupils upon farms where poultry production is a leading branch of the general work of agriculture, or where (as in some cases) it is the one object of the farming; and last, but by no means least, must be mentioned the widespread educational work of the agricultural and poultry Press.

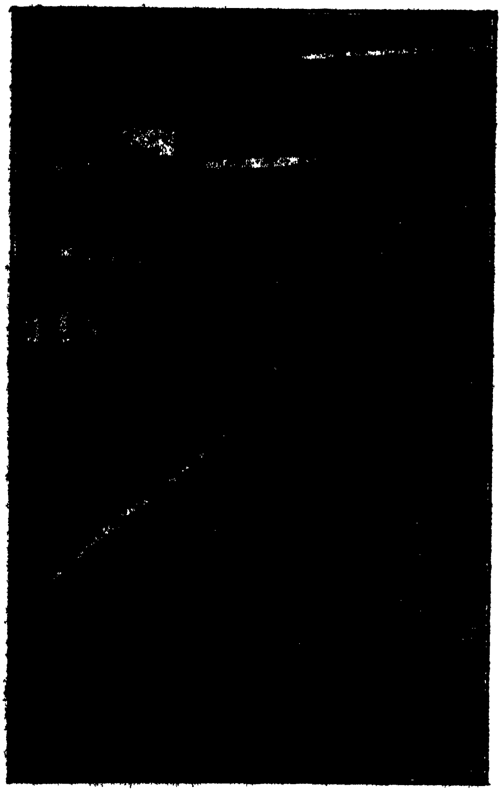
INTESTINES (*see* "Digestive process.")

IRISH FOWLS (*see* "Sussex industry.")

JAPANESE LONGTAILS (*see* "Yokohamas.")

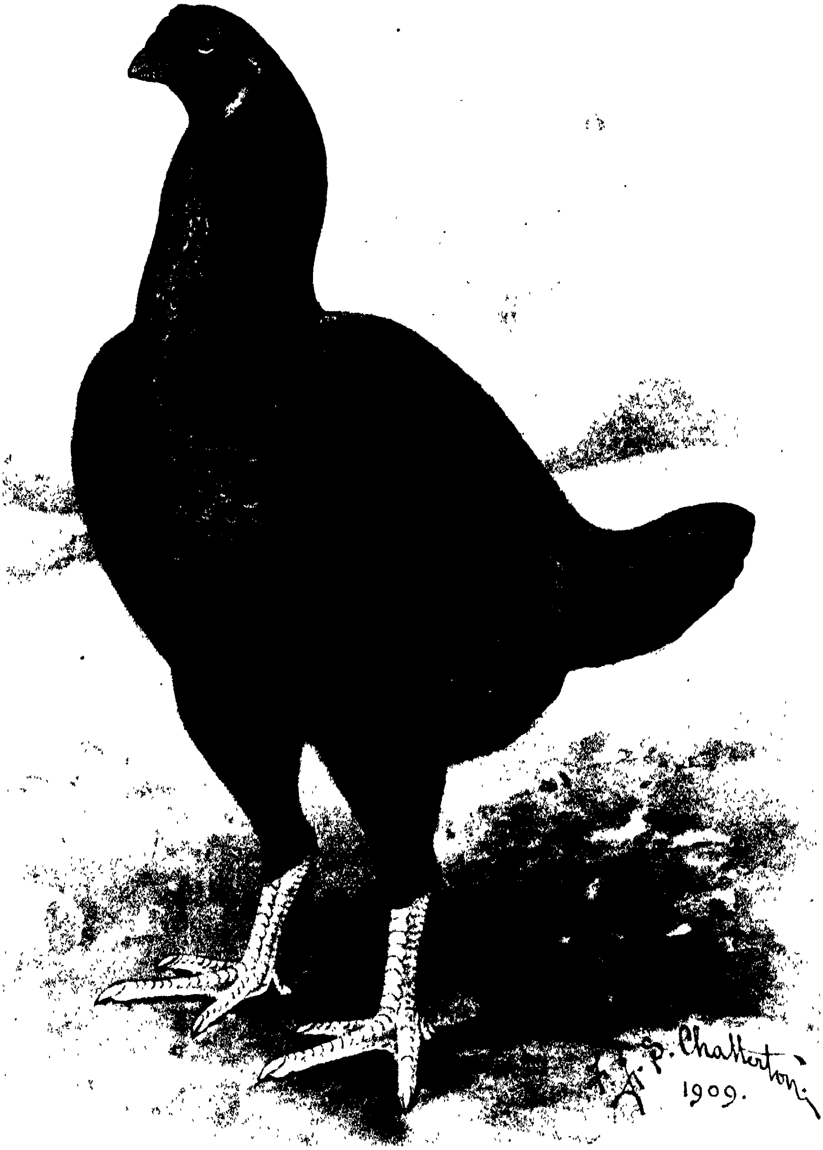
JAPANESE BANTAMS (*see* "Bantams.")

JUDGES AND JUDGING. There are two recognised systems of judging poultry, known respectively as the score-card and "comparative" systems. Considering that all the club standards for the various breeds include scales of points for judging, it might be, and is very generally, believed that the score-card method is universally practised. In this country, however, judging is done almost entirely by comparison, and the score-card system, though generally adopted in America, is only indulged in by a few specialists who have the time and inclination to go in for the more elaborate method. The difference between the two systems is to be found in the *modus operandi* rather than in the actual results. The score-card judge refers to the standard scale of points, and allots or deducts points according to a bird's merits or defects. In America the points are indicated upon a card attached to the pen, and the bird's score is thus to be seen at a glance. This method seems to appeal to many inexperienced fanciers, who are apt to forget that a bird which scores 95 under one judge may score only 85 under another. In score-card judging one experiences just the same differences of opinion that are met with in comparative judging. The latter method consists of simply comparing the birds in their pens, merit for merit and fault for fault, without the more elaborate plan of apportioning their points, and it is found to answer more satisfactorily in this country for several reasons, but chiefly because English all-round judges would never have time to draw up tables of points for every bird in the show. It needs no scale of points to enable an experienced English judge to recognise an inferior specimen at the first glance, and he need waste no further time with it. It might be better for the exhibitor if every bird was entitled to a score-card, but under present conditions our judges are so hard worked that they could certainly not be called upon to adopt the innovation. The comparative system of judging demands more instinctive ability, greater experience, quicker perception, and more self-dependence, and though mistakes do occur (since judges are not infallible) it is equally certain that they also occur where the score-cards system is adopted.


An English Poultry Judge at Work.

There are two classes of judges—the specialists and the all-round adjudicators. The former confine their attention to the particular breed or breeds in which they

PLATE NO. 54


F. J. S. Chatterton 1909.

Indian Game Hen.

(*The property of Messrs. Firth Bros., Wharton Farm, Acton Vale, London.*)

Winner of Champion Cup and Challenge Cup Wimborne, firsts and Specials at Royal (Reserve for Championship), Royal Counties, Horsham, Southall, Stockton, Weston-super-Mare, Horfield, etc.

are most interested, and are chiefly in request for club shows or one of the more important events where a large number of specialist judges are employed. These are generally successful breeders, and are in most cases elected as club judges by the specialist societies to which they belong. The all-round judges are the men who undertake to judge every breed of poultry, and, naturally, these are generally engaged for the smaller shows, which cannot afford to employ a number of specialists. The all-round judge is often a specialist himself in certain varieties, and has invariably had a considerable experience of poultry, as a breeder, exhibitor or reporter for the fancy journals. He is prepared to make the awards in any class of poultry, and it does not necessarily follow that because he has never bred a certain variety he is unable to judge it.

It is an interesting point as to what class of fanciers make the best all-round judges, and it has frequently been asserted that no man can judge properly unless he has been a successful breeder of each and every variety he adjudicates upon. It is undoubtedly true that the experienced breeder possesses a substantial advantage, but it does not necessarily follow that he makes the best judge for that reason, for he may not possess the requisite qualities that go to make a good judge, namely, a good eye for a bird, and the ability to make up his mind. Some of the most successful breeders have been quite at a loss, when confronted with a large class of birds, to pick out the best. Others have been unable to decide the crucial point, and have spent an hour or more over a class whereas a good natural judge, with less experience as a breeder, might have picked out the winner in a few minutes. Therefore, there is very good reason for the assumption that successful judges are born, and not made, though the judge's instinctive ability to pick out good birds and decide between their merits is enhanced by practical experience of the various breeds, their characteristics and the methods of breeding them. It is, of course, inevitable that the awards of every judge should be freely and often adversely criticised. Fanciers as a rule are the best of sportsmen, and accept defeat in philosophic mood, but among such a large community there are naturally a number of exhibitors who are blind to the merits of any bird but their own, and who apparently forget that a judge is not in a position to share their enthusiasm, but is merely required to exercise his unbiassed opinion. Mistakes do occur, as we have said, and there are times when, upon looking over a class a second time, a judge may be dissatisfied with his placing of the awards; but many so-called "mistakes" are merely differences of opinion, and the experienced exhibitor knows well that unless a bird stands out head and shoulders above its fellows he cannot expect every judge to place the same value upon it.

Discrepancies in judging are of frequent occurrence. A bird may win a first prize at one show and only gain a highly commended card at the next, or *vice versa*. It has even happened that a bird that has won first prize at the Dairy Show under one specialist judge has been passed unnoticed a month or so later at the Crystal Palace by another specialist judge. Surely, the inexperienced fancier will say, one of these judges must have been mistaken. But it does not necessarily follow that any mistake was made. At these large shows the quality is good and competition keen, and minor details decide great issues. One judge tolerates a minor defect that another dislikes, or lays more stress upon a certain characteristic than another, and so the discrepancy occurs. In many varieties, however, the same bird will win at every great show throughout the season under a dozen different judges, for when a specimen of outstanding merit appears very few judges fail to recognise its value. But at the smaller shows discrepancies and give a special prize in addition. As, however, the personality of the judge has a great influence in attracting entries, it is not necessarily good policy to select an inexperienced or unpopular judge because he happens to quote a low fee. Judges advertise their distinctions and qualifications in the fancy journals, but many of the more distinguished adjudicators are know by reputation, whilst others obtain engagements through canvassing, and some by the influence of their friends.

It is inevitable that, besides being freely criticised for his awards, a judge is never entirely free from suspicion but though there may be, and no doubt are, black sheep in the flock, the recognised judges of the present day are, on the whole, a worthy and honourable body of men, undertaking difficult and thankless tasks, which frequently necessitate much travelling under unpleasant conditions. Collusion between judges and exhibitors is not unknown, but happily it exists more in the imagination of dissatisfied exhibitors than in actual fact, for a man who sets out to make a career as a judge (in which he may win honour and respect in spite of criticism) well knows that collusion and dishonesty may at any time land him in difficulties, and one slip will assuredly spoil his career. In his own interests, therefore, the modern judge of the better class is honest and exercises his opinions to the best of his ability.

JUNGLE FOWL (*see* "Origin")

KEEL. The breast bone

KHAKI DUCKS (*see* "Ducks")

KILLING, METHODS OF (*see* "Marketing.")

END OF VOL I

Printed by Percy Lund, Humphries & Co., Ltd., Bradford and London 19758